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Original Communications

PRESIDENT'S ADDRESS

SOME FUNDAMENTAL ELEMENTS IN THE ADVANCEMENT OF MEDICINE.*

BY JOHN A. SAMPSON, M.D., F.A.C.S., ALBANY, N. Y.

THEODORE ROOSEVELT is well-known as a great statesman, fighter, big game hunter, explorer and forceful writer. What he accomplished and what he was is a matter of history—but why? There were undoubtedly many factors which contributed to his success—his personality, energy, ability to acquire knowledge, to form opinions (make a diagnosis), and to convince others. A study of his boyhood days, as described by his biographers, shows us that he had two hobbies which he pursued with constancy and with all his energy. One hobby was the study of natural history, especially ornithology, and the other was reading. These hobbies were not mere whims, but were taken seriously by him as a boy. They were his chief vocations then. In later years they furnished him with much recreation and pleasure, were never neglected, and in all of his undertakings were deliberately planned for.

At the age of ten he opened a room in his home which he called "The Roosevelt Museum of Natural History," and he later learned how to skin and stuff birds. At the age of fourteen, when making a trip up the Nile with his parents, he was much more interested in the birds than in the wonders of Egypt. He makes no mention of the pyramids in his writings, but records with enthusiasm that he found

NOTE: The Editor accepts no responsibility for the views and statements of authors as published in their "Original Communications."

*Forty-eighth Annual Meeting of the American Gynecological Society, Hot Springs, Va., May 22, 1923.

at Cairo a book which greatly helped him, written by an English clergyman whose name he forgot, on the ornithology of the Nile. At the end of his freshman year at college he with H. D. Mills published a catalogue of the summer birds of the Adirondacks, in Franklin County, New York. He was elected president of the Natural History Society of Harvard. William Roseco Thayer, in analyzing his career at Harvard, states that "he did fairly well in several unrelated subjects, but achieved prominence in one, natural history." Roosevelt hoped then to become a professor of natural history, but later gave up this plan in order to go into politics.

His great interest in birds during his later years is well shown by the following incident related by Sir Edward Grey in his address on recreation before the Harvard Union, December 8, 1919. While Roosevelt was still president of the United States, Sir Edward Grey received a letter from Mr. Bryce, who was the British Ambassador at Washington during Roosevelt's administration, stating that President Roosevelt intended to travel as soon as he was out of office. "He was going to travel in Africa, to visit Europe, and to come to England, and he was planning his holiday so minutely as to time his visit to England for the spring, when the birds would be in full song and he could hear them. For this purpose he wanted it to be arranged that somebody who knew the songs of the English birds should go for a walk with him in the country, and as the songs were heard, tell him what the birds were." Roosevelt carried out his plans and in May of the year 1910 he spent a day with Sir Edward Grey, who was also an ornithologist, studying English birds and their songs.

The details of this trip alone with Sir Edward Grey are delightfully told by the latter in the above-mentioned address. Roosevelt's sister also refers to this trip in the biography of her brother. In his letters to her he wrote with enthusiasm of the reception given him in England, but most of all he wrote with keen delight of his "bird walk" through the New Forest and over the adjacent lowlands and uplands, with that fellow bird lover, the secretary of foreign affairs, then Sir Edward, now Earl, Grey.

In the study of ornithology as a boy he learned to observe, record observations, apply himself in mastering the subject, and draw his own conclusions. The mastering of that one subject was a wonderful training in learning how to master others. In the study of living birds he realized the importance of the conservation of the natural resources of this country, for the sake of birds and for man. He was a greater statesman because he was a great ornithologist and naturalist.

I believe four factors were largely responsible for his success in life: first, his personality; second, his energy and persistence; third, the training in learning how to acquire knowledge derived in large

part from his pursuit of ornithology; and fourth, his ability to impress people with his thoughts by his convincing speaking and forceful writing, i.e., his ability to use the English language.

The hobbies of Roosevelt were of great value to him as a statesman; the same ones would likewise be of great value to a physician, for the habits and methods of observation, of recording observations, and arriving at a diagnosis in the study of ornithology could easily be applied to the study of medicine, both ornithology and medicine being branches of biology. Physicians, as well as statesmen, should know how to use the English language.

THE INFLUENCE OF HOBBIES IN GENERAL, AND ESPECIALLY BIOLOGICAL ONES

Every child likes that form of recreation for which he is best fitted, and by application he may become very proficient and excel his comrades. This often becomes his hobby and is a most important factor in his development. Likewise in his school work he prefers the subjects for which he is best adapted and these become hobbies, even a form of recreation, as compared with others, which he dislikes because they are difficult for him to acquire and in which it seems impossible for him to become proficient. The hobbies of a boy need to be harnessed. At times they should be given free rein and encouraged, in order that he may acquire the methods and habits of attaining success in one subject. This he finds is accomplished by intelligent application and "sticktoitiveness." At other times they should be curbed, in order that they may not interfere with other important duties. The mastering of one subject teaches him how to master others.

What applies to the boy also applies to the man. Nearly every business or professional man has two sets of hobbies, one extramural (outside of his business or profession), and the other intramural (a part of his business or professional duties). The latter hobby is that particular phase of his work in which he is most proficient and which he enjoys doing, even finding it a source of recreation as compared with other phases of his work, to which he is ill-adapted and which he realizes that he does less well.

Extramural hobbies are of many varieties, such as literature, art, music, golf, tennis, fishing, hunting, gardening, collecting of all kinds from stamps to antique furniture, and the study of the various branches of natural history. Men are serious in the pursuit of these hobbies, the golf enthusiast arranges his professional and business duties so that he may play golf, the fisherman or hunter fishes or hunts for only a few days or weeks in the year, but spends a great portion of the year in planning for the next trip. He lives in recollection of former trips and in the anticipation of those to come. The collector

is constantly arranging and enjoying his collection and planning for the acquisition of new material. The most intimate friendships are often founded on a common hobby.

Hobbies must be taken seriously, for they are not only an important source of recreation, but are also an important factor in the education and training of the individual. He puts his best efforts into the pursuit of his hobby and unconsciously forms habits and methods which may be of great value in his business and professional career.

Natural history offers a wonderful group of subjects in which children and adults may find hobbies, for intensive specialization, or just for the pleasure of dabbling in them as opportunity and mood may come together. There are also hobbies which may be enjoyed to their utmost wherever the individual may be, and especially near his home. They supplement all outdoor recreations, as hunting, fishing, canoeing, walking, camping, golf, motoring, and give an added zest to all of these.

Plants have been collected and cultivated for ages, not only for the scientific interest in plants themselves, but also for the purpose of finding plants valuable as food, medicine, economic purposes, and decoration. Many of the older physicians were interested in botany in order to acquire remedies for use in their profession, and also with the hope of finding some previously unknown cure for disease. Dr. Howard A. Kelly has presented us with a very attractive volume entitled, "Some American Medical Botanists." In the introduction of this book he states that his contribution grew out of a lifelong interest in botany. Many present day physicians are interested in botany; some as collectors, enjoying the outdoor recreation of gathering flowers and later analyzing them at home, the outdoor recreation being of physical benefit to them and the study and analysis of the specimens being of educational value in forming similar habits in the study of disease. Others are investigators, studying wild plants in their natural habitats or transferring them to their gardens. Gardening is a wonderful source of relaxation and education in the cultivation of plants and the study of their diseases. The principles of medicine may be applied to gardening, and vice versa. One of our well known surgeons has successfully applied the principles of surgery to the grafting of trees. The bacteriologist has taught the nurseryman that if he fails to cleanse his knife he may transfer blights due to bacteria to other trees, or branches of the same tree, and the infection resulting will mar his work just as it mars the surgeon's efforts. The botanist who collects answers the question *what*—and can always remain a botanist, but the one who studies the life history of plants and their struggle for existence, who answers the question *why*, must become a naturalist in the broadest sense of the word.

The older ornithologists gathered their specimens as the botanist gathered his plants, and analyzed them. They have furnished most valuable scientific knowledge, and in the analysis of the gastric contents of birds they have helped determine which birds are beneficial and which are injurious to man. The present day laws fortunately prevent the indiscriminate killing of birds beneficial to man. The present day ornithologist studies birds in the field, using a binocular in order to bring the object almost within his reach. Clinical observations have replaced the laboratory with its study of the dead specimen. In order to identify the bird he has to observe it in its natural surroundings and unconsciously he learns its habits and the *why* of its existence.

The older entomologists gathered their specimens, identified them, carefully prepared, classified, and arranged them in rows in sealed cabinets to protect them from moths—but in recent years living insects have been carefully studied in order to determine their life history and their relation to the rest of the world and especially to man. The knowledge acquired from such studies in determining the transmission of certain diseases marks some of the greatest contributions in medicine.

The other branches of biology offer just as attractive fields for recreation and study as those I have mentioned. Biology is the study of living beings, both plant and animal, including man, and medicine is but one of its many branches. Human embryology, anatomy, physiology, bacteriology, pathology, pharmacology, and clinical medicine are subjects which in their pursuit differ in no way from similar subjects in botany and in the study of animal life, other than man. The training in one branch fits one for the study of the other branches. The child who follows natural history as a hobby is already preparing himself for the study of medicine. The physician who has any of these branches for a hobby is unconsciously making himself a better physician.

There are two varieties of naturalists, the collector and the investigator. One answers the question *what* and the other the question *why*. A very good example of the former is shown by the following incident: In July, 1907, I went to Newfoundland. I did not have any definite plans other than to get away from work and possibly find a good recreation ground. On board the steamer from Boston I met two men also bound for Newfoundland, one a lawyer and the other a principal in a boys' school. They told me that they had planned to go up the Humber River as far as the Big Falls to fish for salmon. Salmon fishing in the summer and caribou hunting in the fall are the chief attractions offered by Newfoundland to those desiring recreation. As we became better acquainted they confessed

that the real object of their trip was not salmon fishing, but to collect beetles, and they were especially anxious to obtain some specimens of the species *carabus meander*. As a boy I had been interested in entomology, especially moths and butterflies, but I soon found that we had very little in common; for they were distinctly coleopterists and very highly specialized ones, having very little interest in any insect outside of that group. I have never seen collectors so intense and thorough as they. At every opportunity, (and from Boston to Humbermouth, Newfoundland, the opportunities were many), they hunted for beetles. At Humbermouth I procured a guide and some provisions and went up the Humber River to the Big Falls, expecting to see them there later. I did not meet them until my return home, on the steamer from Hawksberry, Cape Breton, to Boston. My first question was, "Did you find *carabus meander*?" With great satisfaction one of the coleopterists produced from his pocket a bottle containing two or three specimens of this beetle. They did not risk carrying the much-prized specimens in their baggage. I next asked, "Where did you find them?" expecting that they were procured in the cliffs about the Big Falls of the Humber, or in the bogs of the interior. But no, they were found beneath stones or boards in the back yard of the house in which they had spent their first night in Newfoundland! It was distinctly backyard entomology. The back yard is an ever present and ever fertile, though oft neglected, field in all scientific research. I do not remember whether or not they reached the Big Falls of the Humber, or caught any salmon—and I have even forgotten the names of the coleopterists.

These two coleopterists emphasized the value of thoroughness and nearby methods in collecting. They literally left no stone unturned in searching for the object desired. They were distinctly collectors, and most interested in what a specimen was and where it could be procured. The *why*, the life history of the beetle, and its relation to the world in which it lived, was of little interest to them. The contributions of a collector are of value, but not as great as that of an investigator. The coleopterist who remains a collector of beetles can always remain a coleopterist, but as soon as he attempts to solve the life history of a species and answer the question *why*, he must broaden out and become a naturalist. I have been unable to find an account of the life history or the *why* of the *carabus meander*, but a very interesting description of the habits of another species of that genus (the *carabus auratus*—the golden gardener) may be found in "Social Life in the Insect World," by J. H. Fabre. The methods employed by Fabre in the study of insects could be used to advantage by the scientific investigator in medicine.

MEDICAL EDUCATION

One of the most important duties of the medical profession is that of medical education, our own education and that of others—students, nurses and the public, in order that all may cooperate in the study, diagnosis, treatment and prevention of disease. All phases of this problem have deservedly received so much attention in recent years that one hesitates to add to the splendid and costly structure already created. It is not to the superstructure of medical education that I wish to add, but rather to the elements forming its very foundation, and with particular reference to the training and education of the physician of the future. The child, the possible future physician, must learn to observe closely, think clearly, and be able to convey what he has learned to others. In order to accomplish this I wish to emphasize the importance of hobbies in the study of natural history, as a means to this end—the living book of the great out-of-doors, with its fields, woods and streams, as a source of recreation and unconscious development in the clinical study of plant and animal life, and the future study of medicine. The drawing of specimens obtained on these trips teaches the child to observe the more closely, and furnishes records of things observed. To convey this knowledge to others he must also write and speak clearly. Emphasis on the teaching of natural history, English, and drawing, in the primary grades of our schools, would be appreciated by such a child as a definite means to a better understanding and expression of things observed out-of-doors. A reason is found for classroom work and an intimate relation is established between the school (laboratory) and living (clinical) branches of biological (medical) education. Hobbies in natural history, English, and drawing are the very foundations for better physicians, better citizens and better presidents, and as such should be followed and utilized during the entire life of the individual who is interested in natural history. They should be included in the curriculum of schools of all grades, including our colleges.

Much discussion has arisen in recent years as to what the recent college graduate should have acquired from his alma mater. It seems to me that there are certain things, at least, that a college education should accomplish for those students who attempt to profit by the opportunities afforded them, namely:

1. Enable the student to "find himself"—to determine what he is best fitted to do, or what he may do fairly well. This is not necessary in all cases, as some students enter college with a definite idea as to the work they are to do after graduation.

2. Give him further experience in the application necessary for the comprehension of any subject and in the analysis of information gained, in order to form opinions.

3. Help him to acquire a working foundation especially suited to his future work.

4. Teach him how to speak and write the English language.

It is not my purpose to belittle the value of the study of ancient languages as a means to a better knowledge of our own, or of foreign languages that we may keep abreast of the literature on any subject; or of mathematics as a training in mental gymnastics, or of such important sciences as physics and chemistry, but rather to emphasize the importance of a continued study by the future physician of the various branches of biology (of which medicine is but a part), and the means of expressing this knowledge in English and drawing; and finally the correlation of laboratory and living (clinical) studies, that the student may appreciate the value of each and the inseparability of both.

To this end I would insist that every premedical college course should include the following:

1. Special instruction in clinical biology, or natural history, with the requisition that each student shall present a thesis on some phase of the life history or social relations of some species of plant or animal, based on his own observations.

2. Special attention in speaking and writing the English language. I cannot emphasize this too strongly, because there are many physicians who are college graduates, with years of study of Latin or Greek, or both, and who are also graduates of medical schools requiring for their admission a reading knowledge of French and German, and yet they have never been required to learn the use of their own language.

3. Instruction in freehand drawing, especially drawing objects observed in biological studies. College students are requested to make drawings of objects observed in the courses in biology, and medical students are also requested to make similar drawings in their courses in anatomy, histology and pathology, without ever having had any instruction in the art of drawing, especially as applied to these subjects.

The biologist may be interested in only one branch of biology and in only one phase of that branch. Some graduates in medicine are interested in only one branch of medicine and in only one phase of that branch, but most physicians are clinicians who utilize the laboratory branches as a means to a better understanding of their clinical work, or in order that someone else shall make their diagnoses for them.

The so-called basic sciences, anatomy, physiology, chemistry and pathology, deservedly form a most important part in the curriculum of the first two years of our medical schools. They are all indispensable for a better foundation in the study, diagnosis, treatment and

prevention of disease, but they are inseparable from each other and from clinical medicine. In order to be appreciated as such there must be a closer relation between them and clinical medicine, not only as they are taught in the medical schools, but also in clinical work after graduation. The lack of interest, by many clinicians, even recent graduates from our very best medical schools, in that most important basic science, pathology, is most deplorable and is a reflection either on the fundamental fitness of the individual for his chosen profession, or on the manner in which pathology was presented to him when a medical student. The clinician, especially the surgeon, has a wonderful opportunity to study living pathology, which the laboratory worker unfortunately rarely sees, except in experimental work on the lower animals. To do their best work and make their greatest contributions, clinicians should be fundamentally and eternally pathologists, and pathologists should, at least occasionally, be clinicians.

I believe there is another great danger confronting clinicians and medical students, at the present time. The finer diagnostic laboratory methods, especially the x-ray, are among the greatest contributions to clinical medicine in recent years, but we should be careful that they do not dim our vision, benumb our tactile sense, dull our hearing, and weaken our reason. Keen observation, appreciative palpation, percussion and auscultation, and also the responsibilities of making one's own diagnosis, have been and ever will be the fundamental methods in the study and diagnosis of disease. These are always available and they must be most zealously safeguarded from neglect, both in the teaching and in the practice of medicine.

THE AMERICAN GYNECOLOGICAL SOCIETY

The constitution of the American Gynecological Society states that its object is to promote all that relates to the diseases of women, obstetrics and abdominal surgery. The society has a large and a most important field. The individual who is fortunate enough to be head of the department of obstetrics or gynecology, or of both subjects, in a medical school or hospital, has a great opportunity and an even greater responsibility—the two are inseparable. He should be a good executive, clever diagnostician, skillful operator, an excellent teacher, either himself a laboratory worker or so well versed in these subjects that he can intelligently direct these important branches, and finally he should be a "producer" and make contributions to our knowledge of obstetrics and gynecology. The men who excel in all of these important branches of their department are rare. Fortunate indeed is the medical school or hospital which has at the head of these departments one who executes all of his duties fairly well and excels in a few branches, or even one. The branch in which he excels is, or should be, his hobby, but un-

fortunately his responsibilities often crowd out the opportunity to develop this hobby to its utmost. He realizes that he is judged not by his strength, but by his weakness, and often spends most of his time and energy in work which he is ill-fitted to do, and in which he can never make any real contribution, at the expense of the branch or branches he does well. If he is a producer he is apt to attempt to make contributions on many subjects, rather than to stick to the field in which he excels. He is afraid of public opinion and desires to appear versatile.

I believe it is the duty of every man to make the most of his best talents, for that is the only way he can make his greatest contributions. The work to which he is ill-adapted should be turned over to his associates, and he should be satisfied with a moderate proficiency in these branches. He may be accused of exaggerating the importance of his hobby, and of neglecting other subjects, but that is of minor importance compared with the failure to make the most of the best that he has. These criticisms are temporary, but his real contributions are lasting. The individual is hampered by his responsibilities and by his limitations. A society such as ours is more fortunate, both in its responsibilities and its opportunities, since it is able to meet responsibilities with opportunity. It contains men who excel in executive ability, diagnosis, operating, teaching and laboratory work. It desires their best efforts, each man according to his talent. If members will make the most of their individual ability, the society should be lenient with their shortcomings. I believe that it is of the greatest importance to the society that the fellows present their best contributions at our meetings, in order that the society may share the credit of these and that the published transactions may contain the best that American gynecology and obstetrics have accomplished.

CONCLUSION

The future of gynecology and obstetrics is inseparably united with that of medicine as a whole, and the greater the advancement of medicine the greater the need of specialization, but always in close contact with its other departments. The future of medicine is likewise inseparably united with the advancement of all the sciences which in any way contribute to the study, diagnosis, treatment, and prevention of disease. The most important factors in the advancement of medicine are the education of our students, the greatest possible development of the individual in that particular work which he is best fitted to do, teamwork, and a constant cooperation with the related sciences.

Medical education must begin with the child. The child must learn to observe closely, think clearly, and describe what he has seen accurately. Medicine is but a branch of biology, and the methods em-

ployed in the study of its other branches are similar to those used in the study of medicine. In all, close observation, clear thinking, and accurate descriptions are necessary. Hobbies in the study of the various branches of natural history furnish a child with the incentive for out-door recreation and the clinical study of life in the fields, woods and streams. They also create a desire to learn more about these subjects from the study of specimens which he has collected, and also from the available literature. The hobby furnishes a *reason* for the study of natural history in schools and for the study of English and drawing to give expression to the knowledge gained.

Hobbies in natural history and the study of natural history, English, and drawing, in our primary schools, are the very foundations of medicine in the education of the future physician. A broad interest in one branch of biology naturally leads to an interest in its other branches, including medicine. The more children become interested in biology, the greater the number who will study medicine later with a better training and also a keener appreciation of the importance of the clinical and laboratory branches, and the inseparability of both.

The pursuit of biology, English and drawing, should be continued throughout the entire education of individuals who are interested in natural history and biology. The branches of biology are many and the field in each branch is large and in some form it should never be omitted from the school and college curriculum. Its continued study makes for better citizens, better presidents, and more and better physicians.

The basic sciences, anatomy, physiology, chemistry, and pathology, and their close correlation with clinical medicine, that the student may realize the importance of each and the inseparability of all, are the very foundations of comprehensive education in our medical schools. Of these basic sciences pathology is the most important, as it furnishes a definite understanding for the clinical study of disease, namely living pathology; and the two are inseparable.

Hobbies bring out the best efforts of the individual. The ability to use the English language and either to illustrate or to appreciate the methods of illustration provides the best expression of these efforts. Hobbies and these methods of expression are the foundations for the greatest contributions of the individual in the advancement of medicine.

Medicine, including all of its specialties, can never reach a higher plane of excellence than that of the elements forming its foundations.

RADIOGRAPHY OF CLOSED FALLOPIAN TUBES*

TO DETERMINE THE LOCATION OF OBSTRUCTIONS

BY WILLIAM T. KENNEDY, M.A., M.B. (TOR.), NEW YORK CITY

THE radiographic study of the uterus and tubes following their extirpation, presented by Sampson,¹ has given us an extremely concrete picture of the blood supply of these organs, and has shown us the danger of intrauterine applications with or without pressure when there is any break in the continuity of the uterine mucosa. Peterson,² clearly visualizing the uterus, tubes, and tumors of the pelvis and the abdomen by pneumoperitoneum and radiography, has introduced a classical method of diagnosing pelvic abnormalities. The insufflation of uterus and tubes with carbon dioxide, as done by Rubin,³ in a small, but quite a laudable number of women who have been sterile because of some tubal obstruction, has rendered them able to become pregnant almost immediately and in practically every case has enabled the surgeon to determine the patency or nonpatency of the tubes. Before the introduction of Rubin's method it was clinically impossible to definitely confirm a diagnosis of occluded tubes and up to the present time the location of a preoperative obstruction has remained entirely to the surgeon when the patient's abdomen was opened, and even he with both tubes before him, has found it difficult to satisfy himself as to the condition of their canals. During an operation little time may be required or much time consumed endeavoring to locate the obstruction. In the end the real occlusion could easily have been overlooked, which difficulty might well account for the more or less discouraging results of salpingostomy performed even by skilled gynecologists. Further, Rubin's method has not lessened the surgeon's task of locating the site of the obstructions in or about the tubes until the patient is on the operating table. This task I shall endeavor to eliminate by presenting a somewhat clear diagnosis of the sites of obstruction before operation. I have been filling the uterus and tubes with a 20 per cent solution of sodium bromide and have been radiographing that part of the genital tract which has received the fluid. The pressure in and the quantity which has passed into the cavity have been noted. The ampulla of the tube

*Read by invitation at a meeting of the New York Obstetrical Society, Jan. 9, 1923.

Note: Following the reading of this paper it was learned that an article entitled "X-ray Diagnosis and Gynecology with the aid of Intrauterine Collargol Injection," (*Surgery, Gynecology and Obstetrics*, April, 1915, p. 435) by Dr. I. C. Rubin, had been overlooked. Credit which should have appeared in the body of this paper is hereby acknowledged.

rendering a shadow must be connected with the uterus by a patent isthmus even though the passage between contains no sodium bromide. If the ampulla of the tube does not appear on the radiograph an obstruction must exist either in the isthmus of the tube or in the cornu of the uterus, or the tube has been previously removed.

APPARATUS

The apparatus used to pass sodium bromide solution into the uterus and tubes and to measure the quantity and pressure of the fluid is shown in the following diagram (Fig. 1).

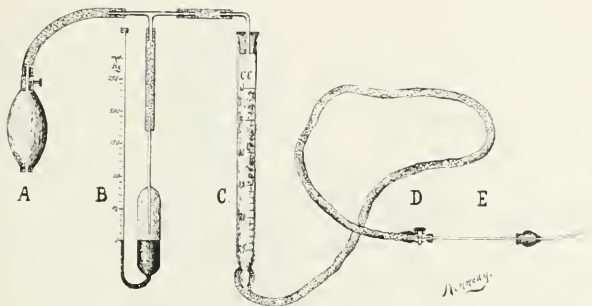


Fig. 1.

- A—Compression bulb with release screw which is used to inflate the sleeve band of a sphygmomanometer.
- B—Mercury Manometer used with the sphygmomanometer.
- C—25 c.c. Burette to measure the Sodium Bromide solution.
- D—Tap to control the passage of the solution.
- E—Uterine hollow sound with rubber washer (Rubin).

PROCEDURE

The rubber connecting tubes, the sound E, the burette C, the sodium bromide solution, a bivalve vaginal speculum and a double tenaculum are sterilized by boiling.

The apparatus is connected as in Fig. 1 with the sodium bromide solution filling it from zero on the burette to the uterine end of the sound and the tap D is closed until used.

The patient is placed upon a cystoscopic x-ray table for radiographing the pelvis, ureters and kidneys. The Potter-Bucky diaphragm is used. A lead screen is used to protect the surgeon while the radiograph is made. Fig. 2 illustrates this arrangement.

Fig. 3 illustrates the lateral views and the corresponding vertical views of the different angles which the Rubin sound makes with the cavity of the uterus. When one knows the clinical position of the body of the uterus the degree of flexion can be estimated.

The first of a series of 20 patients was radiographed June 14, 1922.

Two cases have been omitted because the radiographs were too faint to permit interpretation.

Of 18 cases herein described one had partially occluded and 17 had occluded tubes as demonstrated by insufflation with CO_2 according to the Rubin method before being radiographed. All patients were seen either one or two weeks following their radiographs, and the patient with partially occluded tubes was seen on two successive weeks. None of these patients gave a history of pelvic symptoms following examination.

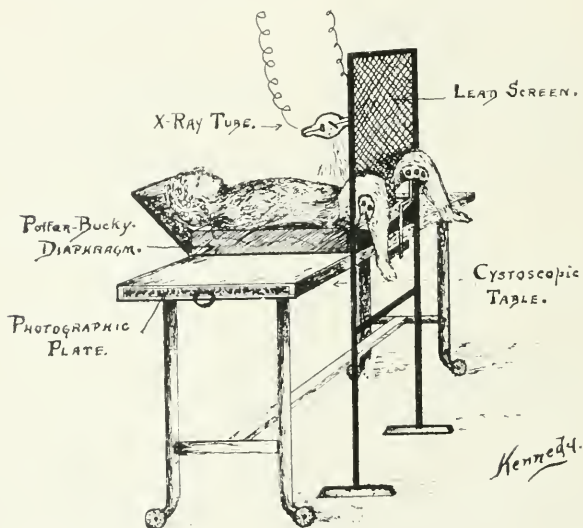


Fig. 1.

The uterus and tubes in the patient with partially occluded tubes (Case 1) cast no shadow. In Case 5 the uterus and tubes cast a shadow at the first examination (radiograph 10), but three weeks later no shadow was obtained with three trials. In Cases 6 and 7 no shadows were obtained. Therefore no sodium bromide passed beyond the internal os. All three cases had anteфлекed, retrocessed uteri.

In 15 cases (omitting Cases 1, 6 and 7), of which radiographs are here shown, 4 tubes are known to have been removed at operation, leaving 26 tubes to be considered. Of these 26, 8 do not appear in the radiograph because they are closed at the cornu of the uterus or in the isthmus, and the remaining 18 tubes are closed at or about the

fimbriae. The occlusions are respectively 30.8 per cent in the isthmus and 69.2 per cent in or about the fimbriae. Of the 18 tubes casting shadows, 11 isthmi cast a shadow but 7 cast no shadow, that is, 18 isthmi allow the passage of sodium bromide solution and 11 or 61.2 per cent cannot contract enough to empty their contents, while 7 or 38.8 per cent can empty their contents in either direction. These

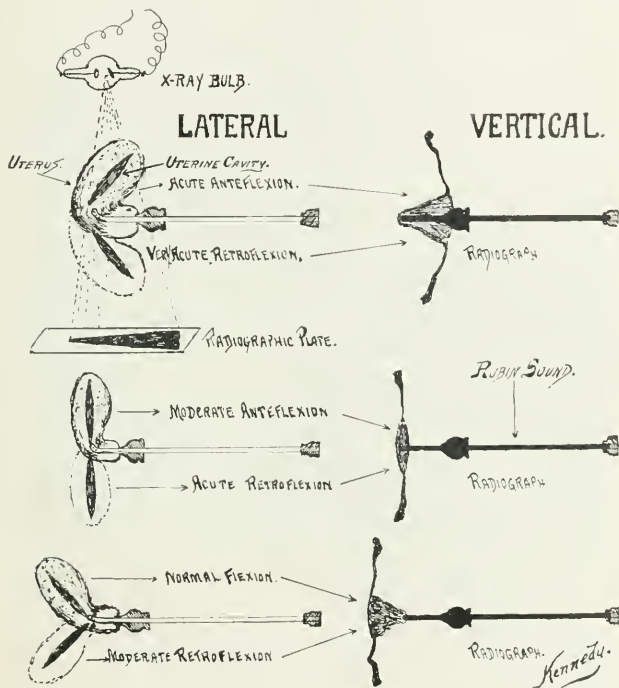


Fig. 3.

percentages are based upon a very small number of cases and may require changing when a larger series has been examined.

Cases 1 to 12 were married for periods varying from one to ten years and have never been pregnant. Cases 13 and 14 each has had an ectopic pregnancy only. Cases 15 to 18 each has had one or more intrauterine pregnancies.

Five cases have been operated upon, one by Dr. Ward, one by Dr. Rawls and three by myself.

Each radiograph has a key in its corner showing the sodium bromide shadows.

CASE REPORTS

CASE 1.—J. M., 26939.—Insufflation with CO_2 —rate sufficient to raise the pressure 100 mm. in 20 seconds; first trial maximum pressure 200 mm.; no gas passed through the tubes. Second trial, maximum pressure 180 mm. when the gas began to flow through the tubes and continued at a pressure of 55 mm.; shoulder pains present. Diagnosis: partially occluded; age twenty-four years; married $11\frac{1}{2}$ years; never pregnant. Numerous nonmotile spermatozoa present (unsatisfactory specimen). Uterus first degree retroverted, slight thickening in both adnexae.



Fig. 4.

Radiogram (Fig. 4).—The body of the uterus and the position of the tubes cannot be seen as the musculature of these organs has forced all the sodium bromide solution into the right side of the culdesac.

Diagnosis.—No information except that at least one tube is patent and from the shadows one would expect the right.

Dysmenorrhea which frequently is associated with an antelexed retrocessed uterus, having a stenosed cervix, would easily be caused by the irritation of the menstrual blood extruded through the tubes into the peritoneal cavity. Further, when any obstruction of the cervix occurs at menstruation, the uterus and tubes can force the menstrual blood and epithelium into the peritoneal cavity, thus easily explaining what Sampson¹ considers a very important factor in the etiology of ovarian hematoma. When the isthmi are open and the fimbriae occluded the menstrual blood would distend the ampullae and cause pain. In acute endocervicitis, occurring about the internal os, when the discharge is rather profuse (gonorrheal) any purulent material escaping into the uterine cavity could easily be forced into the peritoneal cavity, ow-



Fig. 5.



Fig. 6.

ing to the inflammatory obstruction of the internal os. This would easily explain the present conjecture that the gonococci enter the peritoneal cavity by passing over the mucosa and not by way of the lymphatics.

CASE 2.—L., No. 26637, occluded, age twenty-two years, married two and one-half years, never pregnant. Spermatozoa present; nonmotile (unsatisfactory specimen). Uterus infantile; adnexa negative.

Radiograms.—Figs. 5, 6, and 7 show the uterine cavity small and the axis of the body of the uterus about at right angles to the cervical canal. When the pressures were 40 mm. and 66 mm. of mercury, no solution appeared in either tube, but when the pressure was raised to 200 mm. of mercury, the left tube became filled with the solution but the right tube received none.

Diagnosis.—The uterine cavity is very small. Occlusions occur in the isthmus of the right tube and at or in the fimbria of the left. Left hydrosalpinx, small.



Fig. 7.

CASE 3.—S., No. 26716, occluded, age twenty-eight years; married ten years, never pregnant. Spermatozoa not examined. Uterus small, retrocessed, adnexa negative.

Figs. 8, 9, 10, and 11. Uterine cavity 4 cm. by 3.5 cm. (medium size)—tubes apparently hang low on the broad ligaments and parallel with the axis of the uterus; hence are prolapsed. Each tube is open at its isthmus. The right tube has a long slender canal and may also have an accessory canal. The left tube is very probably a hydrosalpinx.

Diagnosis.—Left hydrosalpinx. Occlusions occur in both fimbriae.

CASE 4.—F. W., No. 25521, occluded age thirty-five years, married four years, had a dilatation and curettage two years ago—never pregnant. Spermatozoa numerous, nonmotile. (Specimen unsatisfactory.)

Radiogram.—(Fig. 12) Uterus small, no shadow of left tube—low shadow of the right fimbria.



Fig. 8.



Fig. 9.

Diagnosis.—Uterus infantile, left isthmus occluded, right tube prolapsed, right fimbria occluded.

CASE 5.—C. W., No. 26966, occluded, age twenty-seven years, married five years, husband had two children by his first wife; patient was told she had salpingitis eight years ago. Has had a vaginal discharge for two years. Uterus small, anteфлекed, retrocessed adnexae negative.

Radiogram.—(Fig. 13.) Uterus small, the axis of the body of the uterus makes an acute angle with the canal of the cervix. No right tube visible. A blurred ampulla of the left tube appears with a small canal leading to the uterine cavity.

Radiogram.—Three weeks later, no shadow.

Diagnosis.—Anteflexion of the uterus; right isthmus occluded, left fimbria occluded.

Operative Diagnosis.—8/8/22. The right tube was closed at its fimbria, the fimbria being turned down and attached to the posterior wall of the broad ligament by a



Fig. 13.

small adhesion. The right isthmus, for a length of about 2 cm., was extremely small and had a core-like canal about 1½ mm. in diameter. The left tube was closed at the fimbria, this fimbria being spread out over an ovarian cyst about 4 cm. in diameter and attached by an adhesion to the posterior wall of the broad ligament. There were a few filmy adhesions from the cervix to the posterior wall of the culdesac but these were not drawing the uterus backward. The uterus was normal in position and the anteфлекion was not noted at the operation. It is probable that the uterine musculature may have relaxed under anesthesia allowing the anteфлекion to disappear.

CASE 6.—A. G., No. 31197, occluded, age twenty four years, married four years, never pregnant. Husband not examined. Her complaint was not sterility but painful menstruation for four years. Uterus anteфлекed and retrocessed. At operation 10/16/22 it was found that the axis of the cervix was inclined about 75 degrees to the axis of the uterus.

Radiogram.—No shadow.



Fig. 11.

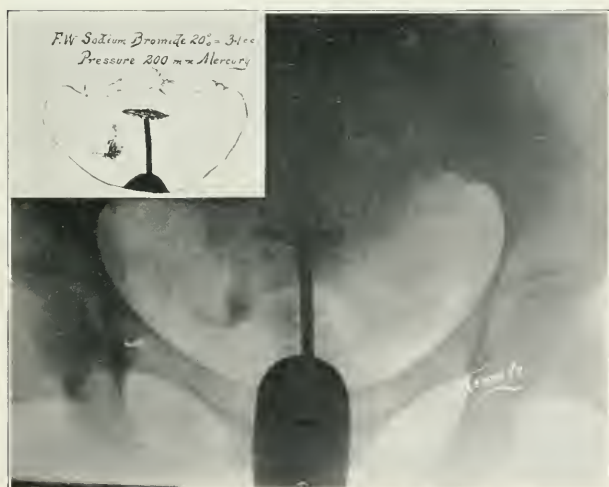


Fig. 12.

CASE 7.—E. T., No. 22637, occluded, age twenty-nine years, married five years, never pregnant. Complaint, sterility. Uterus anteфлекed and retrocessed. Operation three years ago; dilatation and curettage with stem pessary inserted.

Radiogram.—No shadow.

CASE 8.—T. N., No. 26969, occluded, age twenty-six years, married six years, spermatozoa not examined. Uterus underdeveloped. Adnexa thickened, left ovary cystic.

Radiogram.—(Fig. 14) Uterus medium size with axis of body at right angles to the axis of the cervix. No shadow of the right tube, shadow for ampulla of the left tube. There is a very long slender canal from the left cornu of the uterus to the fimbria of the tube.

Diagnosis.—Right isthmus occluded; left fimbria occluded. "Clubbed fimbria" of the left tube. Constricted canal of the left tube.

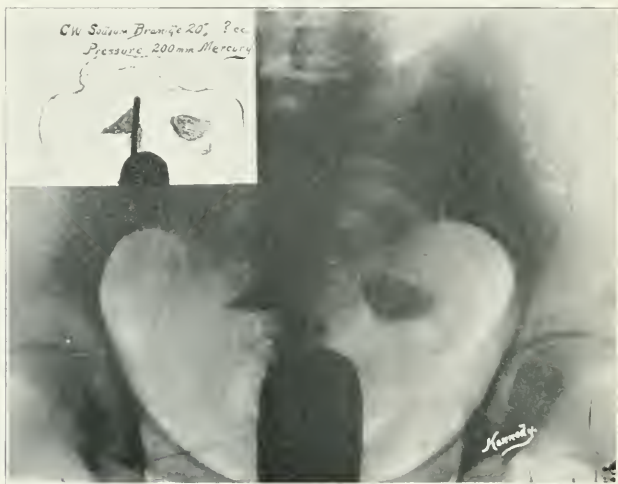


Fig. 14

CASE 9.—J. R., No. 27521, occluded, age twenty-seven years, married one year, never pregnant. Adherent retroverted uterus, thickened adnexa.

Radiogram.—(Fig. 15.) Uterus retroverted, each ampulla casts a shadow.

Diagnosis.—Retroverted uterus; prolapsed right tube, occlusions occur at both fimbria.

CASE 10.—R. P., Private, occluded, married eight years, never pregnant.

Radiogram.—(Fig. 16.) Uterus small, no tubal shadows.

Diagnosis.—Each tube occluded at its isthmus.

CASE 11.—I. C., No. 27532, occluded, age twenty-five years, married four years, never pregnant. Cervix stenosed. Uterus small and forward. Right appendage negative. Left appendage tender. Left chronic salpingitis with pelvic adhesions. Semen test, three examinations, no spermatozoa found. Prostatic crystals present.

Radiogram.—(Fig. 17.) Uterus medium sized, shadow of uterus at right angles to



Fig. 14.



Fig. 15.

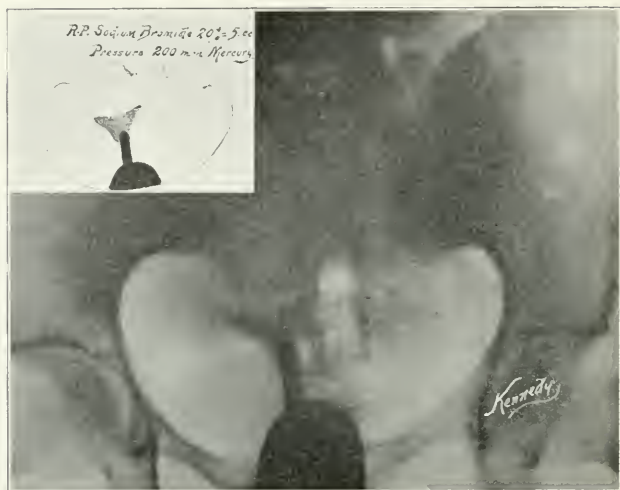


Fig. 16.



Fig. 17.



Fig. 18.



Fig. 19.

the cervix. No ampulla of the right tube visible. Left ampulla and fimbria parallel with the uterus, hence prolapsed, with fimbria in the culdesac near the pelvic wall. Sodium bromide in vagina.

Diagnosis.—Moderately antelexed uterus, right isthmus occluded, left isthmus patent. Left tube prolapsed in culdesac. Fimbria spread out, occluded and adherent.

CASE 12.—M. I., No. 31428, occluded, age thirty-one years, married 10 years, never pregnant. Complaint sterility and pain in lower abdomen for ten years. D. and C. ten years ago. Semen, normal number of spermatozoa with slight motility. Bilateral chronic salpingitis; fibroma uteri; antelexed uterus.

Radioqram.—(Fig. 18) Uterus moderately antelexed, both tubes parallel to the uterus, right ampulla showing but right isthmus distinctly absent. Left ampulla and

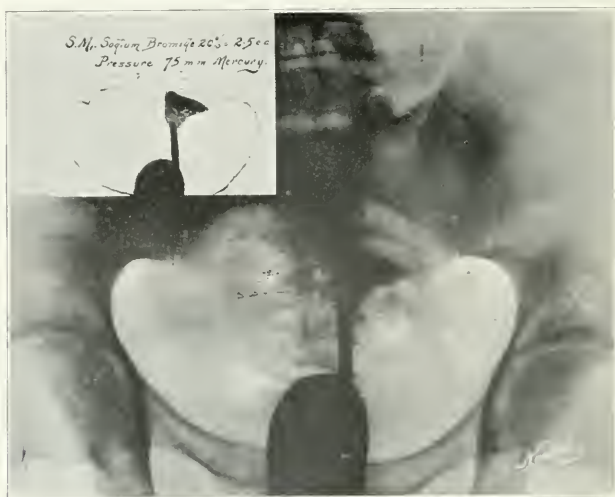


Fig. 20.

left isthmus both showing. Right tube larger than left and nearer its respective pelvic wall. Depression on inner uterine wall about one third of the way from the internal os to the right cornu.

Diagnosis.—Moderate antelexion of the uterus. Right tube prolapsed, closed at fimbria and clubbed. Not a hydrosalpinx. Left tube closed at fimbria and more prominent in the culdesac, not a hydrosalpinx.

Operative Findings.—Nov. 23, 1922. Dr. Rawls. Both tubes were dilated for their outer seven eighths and were buried by adhesions with the ovaries in the culdesac, which adhesions also closed their fimbriated ends. Both ovaries were normal. Just above the internal os on the anterior right surface of the uterus, was a small fibroid, and a similar one on the left posterior surface of the uterus near the horn. There was no stenosis of the cervix although it was rather short in length with the uterus antelexed upon it.



Fig. 21



Fig. 22.

CASE 13.—Private, occluded, age thirty-eight years, married seventeen years. Had an ectopic pregnancy in the right tube thirteen years ago. Tube removed by operation, uterus retroverted, adnexa negative.

Radiogram.—(Fig. 19.) Uterus small, retroverted, no shadow of the right tube, left tube very small with a closed fimbria.

Diagnosis.—Retroverted uterus, right isthmus closed (tube resected). Left tube probably rudimentary in character with a clubbed closed fimbria (small hydrosalpinx).

CASE 14.—S. M., No. 27109, occluded, age thirty-four years, married two years. Right ectopic pregnancy one and one-half years ago. Tube removed by operation. Pelvis negative.

Radiograms.—(Figs. 20 and 21.) Uterine cavity apparently in the same straight

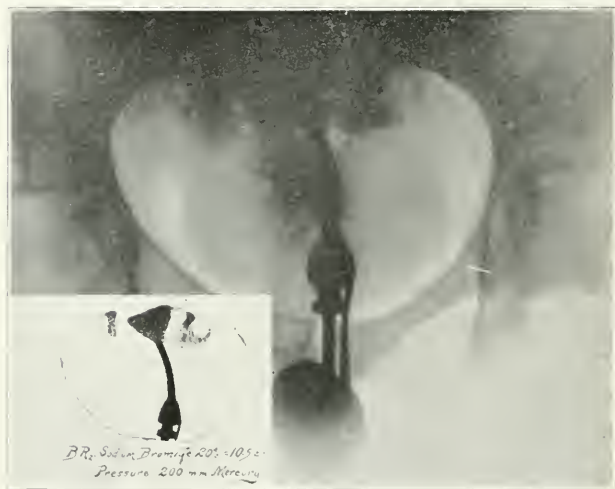


Fig. 23.

line as the cervical canal. Medium sized cavity, no shadow of the right tube. Shadows show a rudimentary left tube with its fimbria closed.

Diagnosis.—Right tube absent, left tube rudimentary and closed at its fimbria.

CASE 15.—B. R., No. 30849, occluded, age thirty three years, married five years; one pregnancy three years after marriage which ended in a spontaneous abortion at four months. Was a widow one year. Remarried and has been living with second husband for five years. No further pregnancy. No spermatozoa examination as husband did not so desire. Uterus indefinite. Both adnexa thickened.

Radiograms.—(Figs. 22 and 23.) Uterus normal position, medium size. There are shadows of the ampullae of both tubes. Tubes are parallel with the axis of the body of the uterus, hence they are on the posterior wall of the broad ligament, prolapsed and clubbed, neither is a hydrosalpinx.

Diagnosis.—Both tubes prolapsed and both fimbria closed.

Operative Diagnosis.—Aug. 1, 1922. Uterus was forward in position and normal



Fig. 24

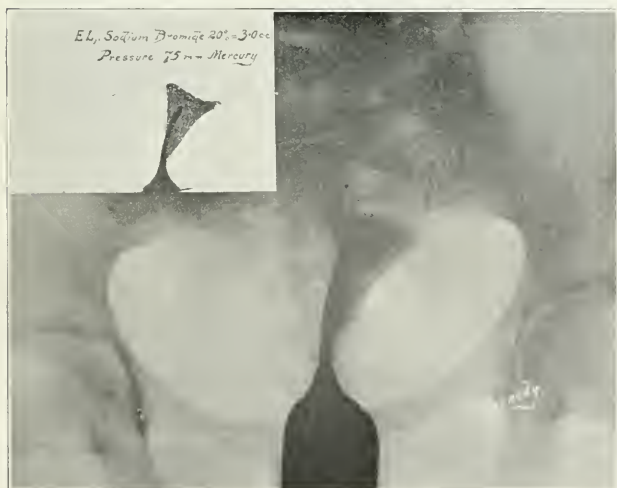


Fig. 25.

in size. Each tube was club shaped, occluded at its fimbria and fastened to the posterior wall of the broad ligament near its pelvic extremity by rather firm adhesions. The peritoneum immediately posterior to the uterus was entirely free from adhesions. Both ovaries were normal.

CASE 16.—F. B., No. 266669, occluded, age thirty-six years, married ten years. Dilatation and curettage eight years ago. One spontaneous abortion seven years ago. One full term pregnancy six years ago. Uterus retroverted and retrocessed. Right ovary prolapsed and tender. Left adnexa thickened.

Radiogram.—(Fig. 24.) Uterus appears retroverted, right tube casts a shadow reaching out to the pelvic wall. Left tube shows a shadow near the uterus parallel with the uterine axis in its proximal portion, then turns laterally towards the pelvic wall.



Fig. 26.

Diagnosis.—Tubal canal small, each tube occluded at its fimbria, left tube prolapsed.

CASE 17, E. L. No. 27521, occluded, age thirty-two years, married twelve years, two children eleven and ten years of age. Abdominal operation eight years ago. Cervix amputated but still slightly eroded and hypertrophied. Uterus enlarged.

Radiograms.—(Figs. 25 and 26.) Uterus normal in position, large, no shadow of either tube appears.

Diagnosis.—Bilateral salpingectomy has been done.

CASE 18.—C. D., No. 31479. Age twenty-nine years, married thirteen years; became pregnant one month after marriage but lost this pregnancy at seven months and has never been pregnant since. Husband died. Patient was widow then for one year and has been married again for two years.

Radiogram.—(Fig. 27.) Uterus moderately large and in position, no shadow of

right tube visible; shadow of isthmus and ampulla of the left tube with distal portion of the shadow faint, because the sodium bromide solution was diluted.

Diagnosis.—Uterus normal in position, cavity large, right isthmus occluded, left tube has a small hydrosalpinx at its distal end and is occluded at the fimbria. This tube is prolapsed and lies toward the pelvic wall.

Operative Findings.—Nov. 28, 1922. Dr. Ward. Both adnexa were buried in adhesions. Left tube converted into a small hydrosalpinx, containing clear serum-like fluid, was behind the uterus. Right tube had a small nodosum at the uterine horn, was chronically diseased and closed.

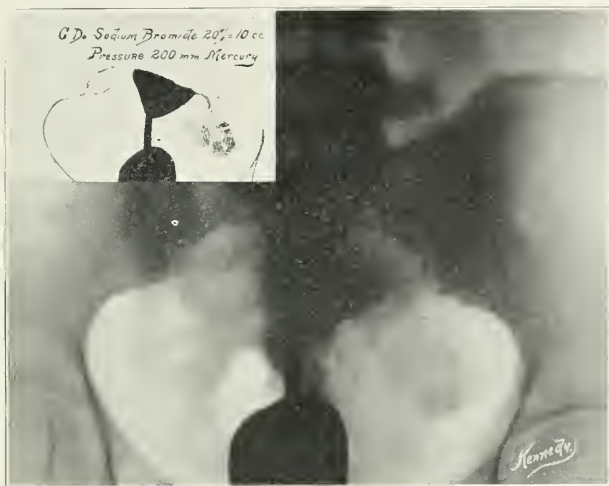


Fig. 27.

CONCLUSIONS

1. In view of Sampson's work no radiogram should be made in any case where there is evidence of bleeding.

2. The degree of flexion of the body of the uterus can be determined if one knows the position of the uterus.

3. The internal os can withstand a pressure of 200 mm. of mercury in the cervical canal without its musculature allowing the passage of any solution into the uterine cavity.

4. That many isthmi, while permitting the sodium bromide solution to pass through their canals can overcome a pressure of 200 mm. of mercury and expel their contents in either direction.

5. That 30.8 per cent of the tubes examined were occluded at the isthmus and 69.2 per cent were occluded at the fimbria. Of the

tubes casting a shadow 61.2 per cent of the isthmi appear and 38.3 per cent do not appear.

6. That a radiogram obtained according to the above method, when one tube is, or both tubes are, patent or partially occluded is,

- a. That probably only one tube is open, in which case practically all the sodium bromide would be seen in that side of the pelvis.
- b. That when the cervix is tightly closed the uterus and tube (or tubes) completely empty their fluid contents into the peritoneal cavity.

7. That the surgeon is able to determine the following points before opening the abdomen:

- a. The length, breadth, position and direction of the canal of any tube casting a shadow.
- b. The exact site of the occlusion, whether at the fimbria or in the isthmus.
- c. Whether a tube, open at its isthmus and closed at its fimbria is empty and simply clubbed, or is filled with fluid, such as hydro- or hematosalpinx.
- d. Whether an operation to overcome the obstruction and thus remove the sterility might hopefully be done when at least one isthmus is open, or might be almost useless when both isthmi are closed.

8. That a study of the sterile woman having no active cervical or tubal involvement should be initiated with carbon-dioxide insufflation (Rubin). If an occlusion is determined, the uterus and tubes should be radiographed as herein described to determine the points of occlusion, and provided the husband is normal, a salpingostomy may be done with some hope of success, if the occlusion is at the fimbriated end of the tube.

I desire to express my gratitude to Dr. George Gray Ward, Chief Surgeon of the Woman's Hospital, for the privilege of undertaking this study and placing material at my disposal for its development, to Dr. A. H. Aldridge, Resident Obstetrician at the Woman's Hospital, for his hearty cooperation in insufflating these cases previous to their being radiographed, and to Mrs. C. A. McIntosh, technician, for her painstaking technic.

BIBLIOGRAPHY

- (1) *Sampson*: Transactions of American Gynecological Society, xli, 1918, p. 16.
- (2) *Petersen*: Transactions of American Gynecological Society, xlii, 1921, p. 116.
- (3) *Rubin*: Jour. Am. Med. Assn., lxxv, 661, Am. Jour. Roentg., March, 1921, p. 120.
- (4) *Sampson*: AM. JOUR. OBST. AND GYNEC., No. 1, 1922, iv, p. 451.

(For discussion, see p. 113.)

DESICATED OVARY: ITS USE, PREPARATION AND A SUGGESTION AS TO A METHOD OF STANDARDIZATION*

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DESPITE the extensive use of ovarian products in therapy healthy skepticism as to the presence in them of a genuine therapeutic principle still exists. That this should be so is not beyond what ought to be expected; and this for the following reasons: (1) our knowledge of ovarian function both alone and in concert with the integral physiologic activity of the female animal is still meagre; (2) ovarian dysfunction is still a nosologic enigma (excepting the menopause syndrome) and the opinion that this or that group of symptoms is the result of ovarian disturbance still carries weight primarily by virtue of being voiced ex-cathedra; (3) assuming the presence of a therapeutic principle or principles in the ovary virtually nothing is known of its chemistry and hence no certain definite measures can be taken in the preparation of the gland to avoid destruction of them; (4) in the preparation of the organ for therapy some products may be inert, others active and an indiscriminate use of them all leaves the sum total of clinical deductions zero.

The subject matter of this report cannot we believe be looked upon as a study in endocrinology. In substance, what was done was simply to administer to a group of women selected on the basis of a single symptomatic manifestation an organic powder derived from ovarian gland after submitting the gland to a very distinct and controlled series of physical conditions. We might suggest that we find ourselves in a position quite unlike the investigator in endocrinology. Such an investigator is thoroughly conversant with and faithfully attentive to every minutiae of clinical detail and differentiation, but his knowledge of the endocrine products he uses is usually limited to the information on the bottle containing his preparation. We are most concerned with the label on the bottle and have fashioned our study to meet that paramount concern. That portion of this report that appears as pertaining to endocrinologic theory and practice is offered as explanatory of the rationale of the study and investigation that gives this report its being.

*Read at a meeting of the New York Academy of Medicine, Section on Gynecology and Obstetrics February 27, 1923.

The ovaries serve a dual function. The prime gonadal function is that of germplasm perpetuator and transmitter. The menstrual cycle is a part of the physiologic mechanism related to germplasm transference. The ovaries contemplated as somatic organs have as their second function that of controlling the secondary sexual characteristics, so-called. This duality of function must be constantly borne in mind since it strikes at fundamental principles both in our attitude toward gynecological symptomatology and therapy. Medical opinion has never been that the individual to maintain health must either possess or exercise his or her prime gonadic function. It follows, therefore, that all gynecological symptoms referable to this function are not necessarily manifestations of disorders. We cannot, we take it, regard sterility and persistent amenorrhea not ensuing from local malformations, inflammatory or neoplastic diseases as evidence of disease in the individual. With the application of ovarian therapy to this phase of ovarian deficiency we are not at present concerned. The use of desiccated whole ovary for idiopathic amenorrhea and sterility has in our experience been productive of nothing but disappointments. To our knowledge there is no evidence extant that is at all acceptable pointing to an active therapeutic principle in the ovary—be it from the whole gland, corpus luteum or ovarian residue—a principle referable to this prime gonadic function.

The ovarian gland studied from the viewpoint of its secondary function promises much from the aspect of therapy. As regards this aspect of ovarian function—to which aspect all further observations and comments are confined—we can postulate syndromes of hyperfunction, deficiency (hypofunction) and dysfunction. We have no desire to discuss these syndromes in their many aspects but simply to point out that in a deficiency disease effective therapy can only be brought about by supplying the deficient chemical. Here the therapy is specific. When we speak of dysfunction we intimate the presence of an imbalance and we do not necessarily point to the character of the therapy. We might, therefore, hope to find in the ovary principles referable both to deficiency syndromes and imbalances. The former would necessarily be specifics and the latter quite likely non specifics. We may if we wish refer to the deficiency principles as “effectors” and other principles as “regulators.”

Where glandular extracts have demonstrable pharmacodynamic actions as have those of the pituitary and adrenal glands, for example, biologic tests for the presence of their action can be used to gauge the concentration of the pharmacodynamic principle in any glandular preparation. But a recourse is lacking for titrating glandular extracts devoid of known pharmacodynamic action. It must be strictly

borne in mind, however, that therapeutic principles need not necessarily have demonstrable pharmacodynamic action.

No constant dependable or serviceable pharmacodynamic principle has yet been extracted from the ovarian gland. Its therapeutic principle or principles, if existent, must still be demonstrated in purely clinical fashion. The data so obtainable do not lend themselves to anything beyond the simplest statistical tabulation. When dealing with phenomena that are subjective we abruptly encounter that group of critics who hypothesize circumstances that are in the domain of the psychiatrist. This is to say, if drug therapy is reputed to remove a symptom the question is immediately raised, if suggestion or some other purely psychic mechanism may not have been behind the effect. The advantage lies all with such critics for they cannot be categorically answered.

On the other hand there is the danger of over emphasizing the value of facts acquired by standards of laboratory exactness. Relative to the vast literature of endocrinology but two scientifically complete researches have resulted. We refer to the isolation and chemical identification of epinephrin with the establishment of which we associate the names of Takamine and Abel, and the work of Kendall in chemically identifying an active principle of the thyroid—thyroxin. No one we are sure will underestimate the value of these two splendid researches. We do fear, however, that the tendency exists to overrate the resulting status of our knowledge with respect to the physiology of the suprarenal and thyroid glands. While no one considers the sum total of suprarenal function the elaboration of epinephrin, the tendency is gaining ground of regarding the thyroid as simply a thyroxin producer. Especially since Plummer demonstrated that thyroxin is curative of the completely athyroidal state—myxedema. This indiscriminate substitution of a part for the whole on bases still no firmer than mere speculation is most certain to thwart progress.

We may with profit carry in mind the significance of these facts when systematically undertaking the study of the efficacy of ovarian therapy. Greatest promise lies in accepting established principles, in abiding by tried formulae and in starting from clinical certainties. The whole is greater than any of its parts and if a therapeutic principle exists in any part of the ovary one would find it in the use of the whole gland. At any rate, it appears to us that a demonstration of the absence of a therapeutic principle in the whole gland would be proof of the absence of it in any part of it. We ought, at least, to begin with the study of whole gland therapy as offering the greatest promise. The therapy, furthermore, ought first to be applied

to a clinical entity generally accepted as bound up with a disturbed ovarian function; naturally the menopause syndrome.

An analysis of the clinical syndrome associated with approaching menopause (and following artificial menopause as well) offers a group symptomatology that varies qualitatively and presents correlations of predominance truly different for each patient. One recognizes symptoms or signs that may be called psychic, those neurologic, those metabolic and those physiologic. Very naturally most of those signs and symptoms are attributes of many and varied disturbances elsewhere in the body consequent upon ovarian dysfunction. And while one truly enough makes a diagnostic judgment on the symptomatology as a coordinated whole it very often happens that the symptom most annoying to the patient—the one for which relief is chiefly sought is based on a cause quite removed from ovarian disturbance. The result under such circumstances is treatment upon a wrong diagnosis with failure to relieve and depreciation of the therapy for the alleged condition.

To cite an example: a patient presents a group of symptoms that is diagnosticated menopause syndrome among which is that of pruritus cutaneus. The patient is most concerned about the pruritus. Treatment is instituted calculated to overcome ovarian dysfunction with equivocal results and decidedly no relief from the pruritus. The true circumstances are these. The patient is entering the climacteric which accounts for most of her symptoms. She has, however, a distinct hyperglycemia (diabetes mellitus?) as well which has caused the pruritus. The annoying pruritus which persists keeps her in such a mental state that she has little patience with the less annoying symptoms and belittles the effects thereon of ovarian therapy. The clinician chalks a zero to the credit of ovarian therapy for that case of menopause syndrome. Such are the difficulties that beset those seeking to properly evaluate by clinical statistical studies endocrine therapy.

Dysfunction operates in a vicious circle. Causes induce effects which in turn are causes for new effects. The circle may be dissipated if severed at important links. And the crucial links are never the psychic—this with all due apologies to psychiatrists. The only hopeful attitude in medical science makes it axiomatic that mental states have physicochemical masters.

We have with the menopause syndrome a peculiar though quite pathognomonic vasomotor disturbance referred to by the patient as "flashes" or "hot and cold flushes." We call it pathognomonic because it is a symptom that is quite exclusively female and so frequently occurs in conjunction with the other complaints of the climac-

teric. It is a symptom that we may safely stand by as indicating ovarian disturbance.

In the cases selected by us for study no patient was accepted as suffering from ovarian dysfunction unless "flashes" were complained of. These patients were fed desiccated whole ovary of our own manufacture put up in capsules containing approximately four grains of desiccated material. The patients were required to take one capsule three times a day. This ovarian therapy succeeded in 100 per cent of cases (approximately 50 cases) in completely dissipating this annoying symptom within 30 days of the beginning of treatment, the time needed being proportional to the severity of the symptom inasmuch as a constant dosage was used in all cases. In many patients the symptom would return within a week after the withdrawal of the therapy and it appeared necessary to continue therapy over a long period of time to keep the symptom suppressed. In a vast majority of the patients the other motley group of symptoms disappeared together with the "flashes." The manner of the patients reporting the effects of ovarian therapy was something after this fashion: "flashes gone, felt stronger," "flashes gone, not so nervous," "flashes gone, feel fine," "flashes gone, feel all right." The symptom complex with ovarian dysfunction about the time of the climacteric for the average patient, at least, eludes detailed expression. Not altogether unlikely is the explanation that it is all the result of vasomotor instability that leads to minor and profound disturbances and to vague discomforts plus the "flashes." Both cow and pig ovaries were used and no difference in efficiency of action could be detected.

A drug that relieves a symptom in 100 per cent of cases is a specific for that symptom. The ovary contains at least one active therapeutic principle. That principle functions to adjust an unstable vasomotor system. A whole ovarian product properly prepared should contain this principle and its activity may be judged by a therapeutic test. Can it relieve "flashes"?

One may assert that very often "flashes" disappear spontaneously. Very true. The menopause syndrome is a self-dissipating clinical entity. The organism usually though not always adjusts itself to this ovarian dysfunction. Its "regulator" activity is vicariously taken up elsewhere. But during the period of function transference the imbalance supervenes. The added ovarian principle enables a smoother, more gradual passage of the ovaries out of the organic symphony. In this fashion it serves its purpose in those cases where adjustment would come about spontaneously. For those cases ovarian therapy does not supply so much an essential loss as a glandular adjuvant filling a temporary want in a transitional period.

Some untoward symptoms arose as a result of therapy with some

of our patients. We interpreted them as signs of overdosage since they disappeared immediately when the dosage was reduced. These symptoms were vertigo and nausea.

The success of Graves in relieving "flashes" with extracts of ovarian residue, that is to say, with extracts of that portion of the ovary remaining after the corpus luteum has been removed, compels the conclusion that the vasomotor stabilizing principle is resident in that portion of the gland at least. Novak employed corpus luteum for menopausal vasomotor symptoms and speaks of his results as "gratifying, if not brilliant." The principle is evidently present then with equal certainty in corpus luteum. Our persistent success in the relief of "hot flashes" with the desiccated whole gland suggests the absence of any antagonism between the vasomotor stabilizing principle in corpus luteum and that in ovarian residue and makes the therapeutic test for efficacy of a preparation as forcefully applicable to the desiccated whole gland as to its residual portion or corpus luteum.

We might well pause to reflect upon the fact that in the single clinical condition in which there is significant agreement as to the efficacy of ovarian therapy apparently equally good results came from the use of any portion of the gland or the whole thereof. There is no need for employing special portions of a gland when they manifest no specificity toward the condition we seek to remedy. Furthermore, there is a limit to the supply of these organic extracts and if clinicians will persist in unnecessarily prescribing portions of the gland not only will the cost of these portions be materially increased but the supply of these portions will mount beyond what could be reasonably accounted for by the total supply available from slaughter houses. This last statement must not be interpreted as a slur upon the integrity of those in the business of preparing glandular products; but it is offered as a reminder that every industry is handicapped by the presence in them of unscrupulous individuals.

In seeking to demonstrate the presence of therapeutic principles of unknown chemical nature as we are called upon to do in ovarian therapy we must seek to prepare the gland for therapy in a fashion to give the greatest likelihood of conserving those principles. Such preparation ideally demands the use of a technic calculated to preserve every chemical entity in the gland. The problem is one of desiccating bacteria laden perishable organic substances in a manner to conserve a multiplicity of widely dissimilar chemical entities as well as render them safe from deteriorating influences. We must ascribe to those principles chemical properties characterized by marked unstableness and seek to conserve them in spite of those properties.

We must hypothesize, therefore, the following physicochemical properties as of these unknown principles.

1. They are thermolabile; that is, easily destroyed by heat.
2. They are easily oxidized and reduced.
3. They are easily liquefied; especially important if we suspect the principles sought for as of lipoid character.
4. They serve as ready pabulum for bacterial life and so are readily destroyed by bacterial action.

The conditions for desiccation calculated to ideally meet the problem herein just advanced are simple in principle but apparently involve technical difficulties that tax the ingenuity of commercial driers; and it is this ingenuity, we take it, that sales representatives of organo-product manufacturers have reference to when they assert that they make the better or best product. I take it for granted that the glandular materials are submitted to drying soon after their removal from the animal. No greater period of time than 18 hours need elapse from slaughter chamber to dryer, the material being kept chilled in a refrigerator in the interim.

The precise conditions of drying under which our material was prepared were not hit upon by chance but were accepted as a result of efforts innumerable to discover the proper combination of circumstances suitable for the dehydration of foodstuff. This research was carried on at the Harriman Research Laboratory during the period of the war at the suggestion of the war department. The writers had no hand in the elaboration of this process but merely adopted it for desiccating glands believing it served admirably to conserve and preserve with a minimum amount of change in its chemical units perishable organic materials.

The essentials for an ideal process for drying glands for therapy are these:—and what is to be said for ovary is as strongly applicable to any gland in which we seek to preserve a principle of unknown chemical nature—

1. The drying is to be done at a temperature below that at which decomposition or conversion is likely to occur. This calls for desiccation under reduced pressure.
2. The prevention of oxidation by drying in a minimum of circulating air.
3. The process should operate to pull water out of the material causing it to dry from the inside out. Where drying takes place from the surface inward the surface forms a hard scale preventing the complete withdrawal of the water from the depths.
4. The drying should be sufficiently rapid to complete the process in a maximum of ten hours.

Essentials (1) and (2) are self-evident. The other two need elabo-

ration. Desiccation does not kill bacteria. Where complete desiccation of the central portions of the glandular materials have not taken place bacteria are supplied with a moistened nitrogenous pabulum when these central portions of the glands are brought in contact with bacteria after pulverization. Bacteria need amazingly little moisture at proper temperature to induce decomposition in organic substances. It is important then as the first safeguard against deterioration that the glands be thoroughly dried throughout their thickness.

As the drying must be done under low heat, dryers are incubators. Submitting a wet, bacteria covered gland to incubator temperature is inviting destruction by bacteria. Rapidity in desiccation is consequently necessary. Low temperature desiccation can be done in ten hours.

To protect properly desiccated glands against deterioration it is highly desirable that one keep the gland powder away from hydroscopic substances. For this reason we would advise against the practice of putting up glandular products in tablet triturate form since the tablet filler is usually a water soluble substance and may be relatively highly hydroscopic.

In what way and to what extent can the clinician investigate the manner of preparation of glandular products at his disposal? A vast amount of information can be secured from employing the following procedure. Secure a sample of the unpulverized desiccated materials* and immerse it in a tumbler of tap water for twelve hours. If the tissue has been properly desiccated it should absorb water and take on again the size and contour of the original volume. This is so because desiccation in vacuo should be carried on at a temperature estimated not to coagulate the protein. You have, therefore, by this procedure a means of checking up low heat desiccation as well as for ruling out the treatment with chemical agents that are in the nature of protein coagulants.

The material thus freshened with water should be prepared for microscopic examination after the manner of fresh material subjected to histopathological study. The ovary desiccated in the fashion outlined herein and subjected to microscopic examination after refreshing gives a picture that would hardly be distinguishable from truly fresh material were it not for the fact that desiccation tends to rupture the limiting membrane walls of parenchymatous cells. The differential staining values of nucleus and cytoplasm of the tissue cells are quite normal. This speaks much for the preservation intact of the many different chemical units in the tissue. It enables one,

*We assume the sample supplied receive no further treatment in preparation for marketing than the simple one of mechanical pulverization.

too, to detect the use of fat solvents that are not protein coagulants for where the fat globules are dissolved away the microscope will disclose vacuoles.

One further test of a product can be applied. Smell the sample to detect the odor of rancid fat. Where desiccation has been slow, where the process has taken from 18 to 24 hours or more, bacteria may have been given the opportunity to induce some decomposition; or oxidation changes have occurred. Very small amounts of decomposed fat leave tell-tale odors.

SUMMARY

Ovarian therapy is still at the stage of administering to a patient an unknown quantity. The wide diversity of clinical opinion as regards the efficacy of ovarian therapy in this or that clinical condition points in our opinion to a crying need for standardization in preparation of the gland for use.

Our experience with desiccated whole gland quite conclusively suggests the presence in it of at least one active principle; that referable to the vasomotor system. The principle is detectable by its effect on the "flash" symptom. Whatever the phase of ovarian dysfunction one may be studying if one is administering ovarian gland be it the whole gland, ovarian residue or corpus luteum one ought to expect it to meet this one therapeutic test; namely, to dispel "flashes." It would, furthermore, be safest as assurance against deterioration that the ovarian powder be put up in capsule form at the initial source of supply in capsule containing about 5 grs. and sealed in packages of 50 and 100.*

*A comprehensive bibliography covering the subject matter of this report is to be found in *Endocrinology and Metabolism*: D. Appleton & Company, New York, 1922.

(For discussion, see p. 127.)

THE LIMITATIONS OF RADIOTHERAPY IN THE MANAGEMENT OF FIBROMYOMA OF THE UTERUS*

By JAMES ALBERT CORSCADEN, M.D., NEW YORK, N. Y.

ONE of the greatest recent advances in gynecology has been the utilization of radiotherapy. About fifty per cent of those needing treatment for fibromyoma of the uterus have been saved from major operations. It is my purpose to outline those factors which, from an observation of about six hundred cases of myoma and uterine hemorrhage, have ruled out radiotherapy and have indicated operation. If we can sharply define what radiotherapy will and will not do, our choice of procedure will be easier.

The action of radium and x-ray is readily understandable if we believe that life growth and physiological activity of a cell are physical chemical manifestations and are governed by the laws of physics and chemistry.

According to the electronic theory of the composition of matter, which seems to be universally accepted by the chemists, chemical change depends on the manipulation of the electrons composing the atom.

Radium furnishes three forms of energy, the positively charged alpha particle, the negatively charged beta particle and the electromagnetic gamma ray. The x-ray furnishes us with only an electromagnetic wave. These have the power of dislodging the electrons in various atoms and in consequence produce chemical change.

We all know how variable is the action of heat and light on different substances. So in the body there is a marked variation in the reaction of the tissues to radium and x-ray instanced in the reproductive system by the graafian follicle which is about five times as readily injured as is the skin.

When a tube of conventional shape containing fifty milligrams of radium is left in the cavity of the uterus for twenty-four hours there occur:

1. A slough of the endometrium about 1 centimeter wide, three centimeters long, and two or three millimeters deep. There is subsequently a slight inflammatory reaction with discharge.
2. A replacement of the elastic tissue and smooth muscles of the blood vessels and uterine muscle by connective tissue.
3. A degeneration of myomatous tissue for a depth of about 1 centimeter.

*Read at a meeting of the Section on Obstetrics and Gynecology, New York Academy of Medicine, February 27, 1923.

4. Destruction of the mature graafian follicles which causes:
 - a. Cessation of menstruation.
 - b. Consequent atrophy of the uterus and of myomata with replacement by hyaline connective tissue.
 - c. Loss of part of the internal secretion of the ovary with whatever consequences that may have.
5. Injury to the bowel and bladder (not observed in my experience).
6. Change in the blood count (also not observed).

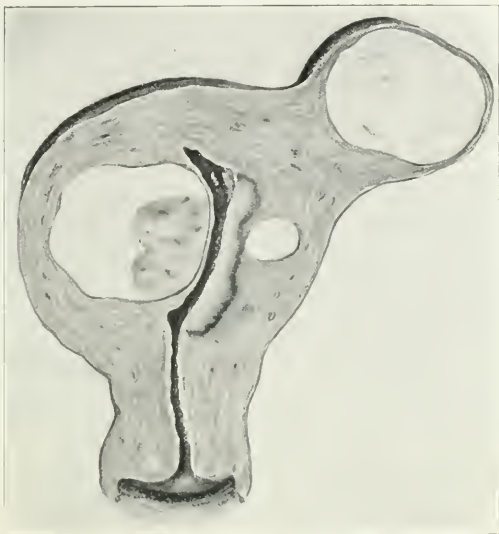


Fig. 1.—Semidiagrammatic drawing of a uterus twenty-seven days after 50 milligrams of radium in a silver capsule, protected by 1 millimeter of rubber were placed in the uterine cavity. There was a slough varying in depth from 1 to 3 millimeters and averaging a little less than 1 centimeter.

These seem to be the actual tissue and physiological effects. Turning to their practical application in the management of fibromyoma of the uterus we are met with more than the simple problem of an anatomical or physiological experiment. We face questions of (1) diagnosis, (2) the nature and potential menace of the tumor, (3) the relief of the symptoms, (4) possible disagreeable effects of the method of treatment, (5) the question of childbearing.

1. Of all these I think the first is of the greatest importance. Before applying radiotherapy in an individual who is a good operative risk, the diagnosis must always be nearly absolute because, in the alternative method of treatment by excision, an exploratory celiotomy

is included. This problem was more acute a few years ago than it is now. At that time the majority of gynecologists were ignorant of radiotherapy and for the most part opposed to it. The management of the problem lay between the family doctor, the patient, and a radiologist. The results of such divided responsibility are illustrated by the following instances:

A competent gynecologist made a diagnosis of fibromyoma of the uterus. The patient persuaded the family doctor to refer her to a prominent radiologist, who gave her a thorough course of x-ray treatments on the diagnosis given to him. At the end of a year the mass had not receded. Operation revealed a dermoid cyst with actively proliferating tissue.

To one of the leading radiologists of this city came a patient with a letter from a prominent Boston physician requesting that she be given the regular x-ray treatment for myoma. On taking a history it was found that the diagnosis had been first made ten years previously, the last vaginal examination had been made four

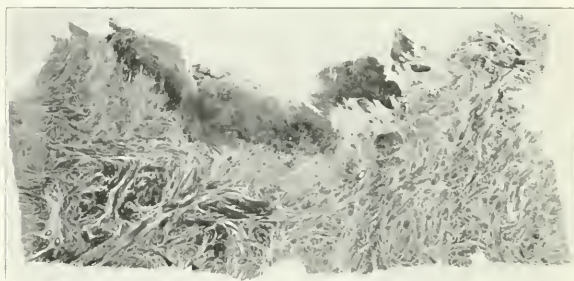


Fig. 2.—Low power microphotograph showing radium slough in Fig. 1.

years previously, and the woman had not menstruated for two years. She had a small retroverted uterus which contained a stony hard mass, three or four centimeters in diameter. Nature had accomplished all that radiotherapy could do.

The second phase of the diagnosis is the exclusion of dangerous complicating pathology. In my experience this has narrowed down to the exclusion of extrauterine and intestinal tumors on the one hand and to carcinoma of the body and epithelioma of the cervix on the other hand. We have discovered during the final examination on patients possessing a myoma of the uterus or suffering from uterine bleeding, diverticulitis of the sigmoid, carcinoma of the rectum, and dermoid and several simple cysts of the ovary, as well as epithelioma of the cervix and carcinoma of the corpus uteri. Contrary to the opinion often expressed, I do not fear chronic inflammations. I have cured by x-ray one tuberculous sinus following salpingectomy (followed 7 years) and have treated with massive x-ray dosage, two cases of large myoma of the uterus, complicated with massive adhe-

sions due to chronic salpingitis (in one case, tuberculous). This was done after an attempted hysterectomy had been abandoned because of the technical difficulties. No apparent harm resulted. Several cases of tuberculous peritonitis of tubal origin have been markedly improved.

To summarize: If at the end of an examination under anesthesia



Fig. 3.—Section taken from fundus in Fig. 1. It shows the uninjured character of the endometrium and still shows the hyperplasia which existed before the radium was applied.

and diagnostic curettage, extrauterine tumor cannot be excluded, the abdomen should be explored. Carcinoma and epithelioma are more easily excluded by the curette and if found properly handled.

2. The nature and potential menace of the tumor. A myoma is benign and needs no treatment until suspicious changes occur. This is in accord with the management of many other benign tumors, such as warts and moles. When however degeneration or inflammation is evidenced by toxic symptoms, anemias, unexplained by hemorrhage

or loss of flesh and strength, with or without local pain or tenderness, or rapid increase in size of the tumor, the mass becomes a potential menace and should be removed. Rapid growth might also signify sarcoma, and even without other contributing factor indicates laparotomy. Masses of large size (over 12 to 15 centimeters) I believe show a higher incidence of degeneration and should also be removed.

3. Symptoms needing relief have been bleeding, dysmenorrhea, pains of many varieties in location and character, urinary disturbances and venous obstruction of the lower extremities. Another factor is the deformity caused by the mass. Many tumors reach large size without symptoms and may become a source of embarrassment to the woman.

Bleeding is the symptom *par excellence* amenable to radiotherapy.

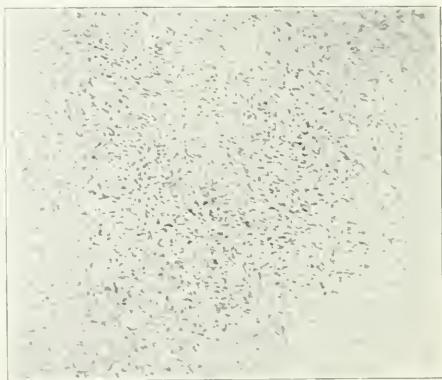


Fig. 1. Section of an ovary removed from a girl of twenty-two years, who had had x-ray treatment over a period of seven years. She had not menstruated for over four years. The stroma is nearly normal. The section was taken from the cortex but nevertheless shows complete absence of the follicles.

It will not stop, however, if the destruction of the follicles has not been sufficient to stop menstruation, or if the endometrium has not been largely destroyed. Underdosage may be deliberate. The effort is made to modify the bleeding without stopping it entirely, small doses being given with the idea that the local effect is the important one. Our specimens, showing the limited local reaction, would not bear this out. I have tried this method in only a few cases. In only one did the mass recede while menstruation persisted. The bleeding rarely becomes regular and the patients require more or less frequent examinations. The mental condition of these patients is bad. The reappearance of the bleeding arouses the fear that the original hemorrhages will return. They lose confidence in the original operator

and in the method no matter what prognosis has been given. In my opinion, if there is any objection to the sterilizing dose and the woman is a good surgical risk, operation should be performed. Other causes of underdosage are:

a. Failure to appreciate the law of inverse squares. An ovary lifted away from the uterine cavity will require more of a dose than one that is normal in its position. If twice as far, four times as much. A radium tube slipped into or placed in the vagina will give a different dosage to the ovaries from one high in the fundus.

b. A broken radium tube gives off only part of its available energy

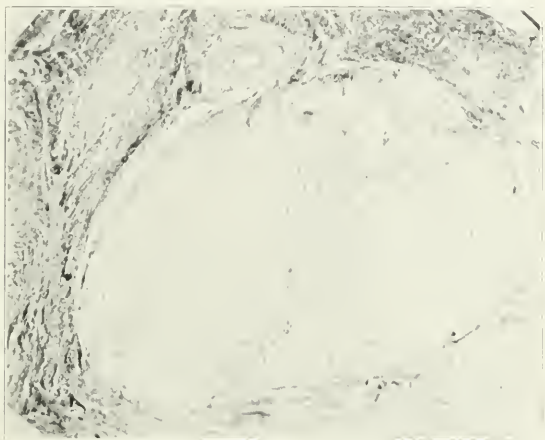


Fig. 5.—Section of a fibromyoma after treatment eight years previously with x-ray, when it measured about 12 cm. in diameter. At autopsy, done for myogenous leukemia, all that could be found of the mass treated was a nodule about 1 cm. in diameter, consisting of hyaline tissue.

because of the escape of a considerable portion of the emanation and consequent loss of the active degeneration products.

Bleeding may not stop with cessation of menstruation if ulceration such as occurs in a protruding and traumatized polyp is the cause of the bleeding. A myoma, pedunculated and hanging out of the cervix or even still intrauterine might be eroded and would bleed irrespective of menstruation. The most difficult variety upon which to pass is the small submucous tumor projecting into the uterine cavity. One must judge whether, after the menopause, this will continue to be traumatized sufficiently to cause bleeding. If so it is better removed. Blood vascular disease such as pernicious anemia, congenital familial telangiectiasis may also continue to cause bleeding from the uterus

after the menopause as well as from the other delicate membranes of the body.

Dysmenorrhea has always ceased with the onset of amenorrhea. On the other hand severe pain unassociated with menstruation has only occasionally stopped (30 per cent). In the operated cases pain associated with a uterine tumor smaller than a four months pregnancy has usually been due to causes outside of the uterus (appendicitis, cholelithiasis, salpingitis) and consequently would not always be relieved by the shrinkage of the uterine mass.

Urinary symptoms have been equally refractory. I have not compared this result with that following operation but I am under the impression that it is not as good.

4. The dangers and discomforts of the method. Dilatation and curettage followed by radium are not without danger. One woman died of pulmonary embolism 20 hours after operation. This must be attributed to the curettage and not to the radium. Two patients had sloughs in the uterine cavity and required treatment. There were three cases of fever and parametritis due, I believe, to operative infection and not to the lighting up of an old focus. They were uterine and broad ligament processes rather than tubal. Furthermore no such condition has followed x-ray exposures in our hands. A few cases showed albumin and casts, particularly after x-ray. All had some toxemia with nausea and vomiting. Of the remote menopause symptoms, only hot flashes and nervousness were of any importance. The discomfort caused by flashes is usually slight, rarely distressing. Properly instructed, a woman rarely will need treatment by ovarian extracts. The patient must be warned of them however because they begin suddenly and if unlooked for, cause considerable apprehension.

Severe nervous manifestations have occurred in five women. All of them had more or less severe nervous manifestations before the treatment, were worse for several months after and in all but one case recovered or bettered their previous nervous condition.

Our experience corresponds with the observations of Adler on the so-called "involutional psychosis" of the natural menopause. He says in his book on the "Neurotic Constitution" that the psychoses of this period occurred in women who had previously shown definite abnormal nervous symptoms.

In women with an unbalanced nervous mechanism, especially those who have given signs of a decided nervous disorder, the artificial menopause should only be induced after a competent neurologic consultation. If under these circumstances radiotherapy is then given, there should be a well planned prophylactic and postoperative course of psychotherapy. Ovarian extract is of little help.

We have not observed any of the vague anemias, trophic and meta-

bolie changes sometimes attributed to the absence of menstruation. Blood pressure was slightly elevated in some of the women over forty years of age but in none of those under that age.

Of the possible late changes in a myoma, sarcoma is the most important. I can find in the literature only three such cases.^{1, 2, 3} Two of these were found in from three to six months after x-ray treatment and seem to have been mistaken diagnoses in the first place. This insignificant number removes sarcoma as a danger. In the cases treated there have been no degenerations or inflammations. Accidents such as torsion may well occur, but have not been observed.

5. Effect on childbearing. Only two patients have become pregnant.

One woman of thirty-seven with a myoma eight to ten centimeters in diameter received 1200 milligram hours intrauterine. She later became pregnant, miscarried at six months, had a perfectly formed macerated fetus, ran a peculiar long septic course without demonstrable pathology and recovered. I believe the cause of the miscarriage to lie in the local sclerotic changes in the endometrium and muscle added to the mechanical abnormality incident to the myoma. The other was a woman of twenty-four years referred by the late Doctor Cragin for excessive bleeding. She had no gross abnormalities of the uterus. She was given a moderate dose of x-ray. Her periods became normal in amount, slightly irregular in periodicity. Three years later she became pregnant and gave birth to an eight and one-half pound boy, perfectly formed. He is now three years old and healthy.

The problem of future childbearing may be approached from two directions: first, the effect of radiotherapy on the uterus and second, the effect on the ovum. Radium as demonstrated above produces a slough with scars in the endometrium and sclerosis of the vessels and myometrium. These uteri are not pliable. I know of one uterus treated by radium in which the cervix ruptured while dilating over the head and caused death by hemorrhage. The x-ray on the other hand has only a mild action on muscles and vessels. I see no objection, from this standpoint, to giving moderate doses of x-ray through the abdomen.

The effect on the ovum, however, is much the same with either method. There is some evidence that injury without destruction of an ovum may alter the development of the embryo so as to cause physical abnormalities and disturbances of growth and mentality. Nevertheless some mothers have gone through the ordeal and produced perfect children. I should therefore say that with a view to future pregnancy, x-ray in nonsterilizing doses to patients suffering from bleeding without myoma is justifiable when hysterectomy is the only

alternative, but that where a myoma is responsible for the bleeding, myomectomy is preferable.

CONCLUSIONS

1. In the treatment of myoma of the uterus by the radiotherapy the selection of the case is the most important phase.

a. Responsibility should be undivided.

b. Extrauterine neoplasms and malignant growths of the uterus must be excluded. Chronic adnexal inflammation so light as to escape diagnosis need not be a deterrent.

c. Symptoms of toxemia, anemia unexplained by loss of blood, local pain, tenderness, change in consistence of the tumor, rapid growth, and large size may indicate inflammation, degeneration or sarcomatous change and demand excision.

2. Of the symptoms associated with myoma:

a. Bleeding due to ulceration (polyps, submucous, pedunculated myomata) or blood vascular disease (pernicious anemia, familial telangiectasis) may not cease with the onset of the menopause. In our experience all others will.

b. Pain associated with menstruation will cease but pain occurring at other times may not.

c. Urinary disturbances are not well relieved.

d. Shrinkage of a myoma will almost always follow adequate doses of radium and x-ray but the discomforts of the dosage necessary coupled with the potential danger in the large mass make operation preferable.

3. Doses of radium and x-ray insufficient to induce a menopause are unsatisfactory. The mass may fail to shrink. The effect on the bleeding is uncertain. The mental reaction of the patient is bad.

4. Hot flashes are constant and slight increase in nervous irritability is frequent after radiotherapy. The former are not important. The latter demands caution in using the method in women who show any mental abnormality.

5. Childbearing is possible after radiotherapy.

a. Radium should never be used in a woman who may become pregnant. The sclerotic changes predispose to dystocia.

b. X-ray may disturb the structure of an ovum and determine abnormal structure or development of the fetus. It should only be used where hysterectomy is the only alternative.

REFERENCES

- (1) *Jacquin, P.*: *Gynécologie et Obstétrique*, 1921, iii, 90. (2) *Shoemaker, G. F.*: *F.* of the College of Physicians of Philadelphia, 1915, xxxvii, 142. (3) *Hinterstossel, H.*: *Zentralblatt für Gynäkologie*, 1920, xlv, 977.

DEXTROVERSION OF THE UTERUS, WITH CONGENITAL ABSENCE OF LEFT FALLOPIAN TUBE, OVARY, BROAD LIGAMENT, ROUND LIGAMENT, KIDNEY AND URETER*

BY WALTER T. DANNREUTHER, M.D., F.A.C.S., NEW YORK CITY

(Associate Professor of Gynecology, New York Post-Graduate Medical School and Hospital.)

ALTHOUGH the genital malformation described in the appended case report may have no special significance, it is of interest because of its extreme rarity. Congenital absence of one tube or ovary is not unusual, but complete absence of both the broad and round ligaments on one side, particularly without a concomitant uterine developmental defect, is very rare, and a full-term pregnancy occurring in the presence of such a genital malformation is at least unique. While partial development of adnexa may be due to fetal peritonitis, total absence is unquestionably due to prenatal arrested growth. My patient was distinctly undernourished and underdeveloped physically but showed no evidence of either hereditary or acquired syphilis.

CASE 26591: R. B., aged twenty-five, married five years, began menstruating during her thirteenth year. Before her marriage there were intervals of six to eight weeks between the menstrual periods, but since then the flow has been fairly regular every four weeks. Three years ago she was delivered of a healthy, full-term child, which she nursed for nine months. The child is still living. She has had two miscarriages: one two years ago and one eight months ago. They were both spontaneous at the eighth week. No curettage was done in either instance, and the patient has never been operated upon before.

Mrs. B. entered the hospital complaining of pain in the right lower abdominal quadrant, not increased during menstruation, occasional nausea after meals, constipation, leucorrhœa, and some discomfort in the sacral region. These symptoms had been present for about two years.

On examination, the thyroid was found to be slightly enlarged and prominent, but apparently causing no symptoms. The lower pole of the right kidney was palpable, but the left kidney could not be felt. There was hyperalgesia at Morris' point on the right side, and tenderness on pressure over McBurney's point. The perineum was intact and all the external genitals were normal. The cervix was irregularly lacerated, with considerable ectropion, and evident hypersecretion. Cervical smears were negative for pyogenic microorganisms. The uterus was dextroverted, normal in size and consistency, and symmetrical in outline. Its mobility was limited, however, and bimanual manipulation was distressing to the patient. The adnexa were not palpable on either side.

Preoperative diagnosis: Chronic appendicitis, pelvic adhesions, dextroversion of the uterus, and lacerated cervix.

*Presented before the Section of Obstetrics and Gynecology, New York Academy of Medicine, February 27, 1923.

Operation: December 12, 1922. After a trachelorrhaphy, the abdomen was opened in the usual manner through a suprapubic longitudinal incision. After clearing the pelvis of intestines, I discovered that the appendix was thickened and firmly adherent to the right tube and ovary. The latter organs themselves, however, were normal in every respect, as were the right broad and round ligaments. The

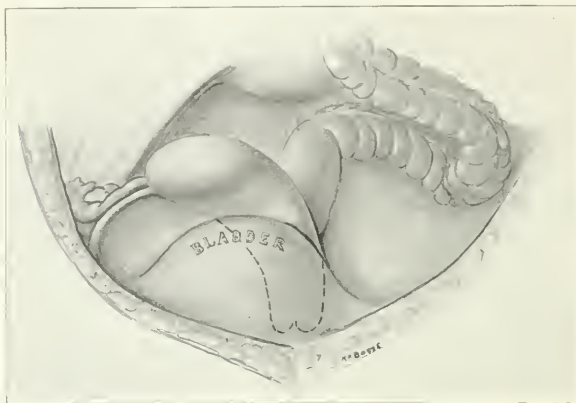


Fig. 1.—Semi-diagrammatic drawing of the pelvic abnormality disclosed by laparotomy: The uterus is dextroverted, but normal in size and consistency, and symmetrical in outline. The right adnexa are normal. The left broad ligament, round ligament, tube, and ovary are absent. The bladder assumes its normal relation to the uterus on the right side, but follows the margin of the uterus downward on the left side to the level of the internal os, where it merges with the parietal peritoneum. Dense adhesions binding the chronically inflamed appendix to the right adnexa are purposely omitted in the illustration.



Fig. 2.—Cystoscopic view of the region of the trigone. The right ureteric orifice is seen in its proper location. The upper limit of the vascularization of the trigone slopes gradually toward the left side of the vesical neck. There is no left ureteric opening and no interureteric ridge.

adhesions were cut between clamps and the appendix removed. It was then noticed that the uterus remained dextroverted despite its release, and that the left broad ligament, round ligament, tube and ovary were entirely absent. The peritoneum covering the bladder followed the left margin of the uterus down to the vaginal

vanlt and then merged with the parietal peritoneum, as depicted in Fig. 1. The left iliac fossa was empty, except that it might have been occupied by the sigmoid and rectum before they were dislocated upwards by the laparotomy gauze pads. No left ureter could be palpated or otherwise identified.

The patient made an uneventful recovery from her operation, and was persuaded to return for a cystoscopic examination. This revealed a normal ureteric orifice, in its proper location, on the right side of the bladder, but there was no interureteric ridge, and not even a line of demarcation between the trigone and posterior portion of the bladder floor (Fig. 2). The upper delineation of the vascularization of the trigone sloped gradually from the right ureteric orifice to the left side of the vesical neck, and was not characterized by the usual coneave curve. There was no ureteral opening on the left side, and in the area in which it is normally situated the bladder was unusually pale. Two or three small capillaries only were found in this region. Absence of the left ureter was verified by a subsequent indigo-carmine test, the dye issuing from the right ureter in a forcible, highly colored stream, but not elsewhere.

The patient has persistently refused to submit to an x-ray examination of the urogenital tract, so that a positive diagnosis of absence of the left kidney cannot be established. In view of the other clinical evidence, however, I believe that the existence of a solitary kidney may be presumed.

2020 BROADWAY.

INSUFFLATION OF UTERUS AND FALLOPIAN TUBES*

REPORT OF 600 CASES EXAMINED BY THE RUBIN METHOD

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A STUDY of the Rubin method for the determination of tubal patency was begun at the Woman's Hospital two years ago.

The apparatus and technic which were adopted for this study were essentially the same as originally described by Rubin.¹ The apparatus as shown in the diagram (Fig. 1) consists of a pressure tank (A) filled with carbon dioxide; a reducing valve (B); a 40 c.c. siphon flow meter (C) which is immersed in tap water in a wide-mouthed one liter bottle (D); a mercury manometer (E) and an intrauterine canula (F). The intrauterine canula (F) consists of a Keyes Ultzmann Canula over which the rubber tip of a male anterior urethral syringe has been fitted to close the cervical canal. The outlet of the reducing valve (B) is connected to the inlet of the siphon flow meter (C) by pressure tubing (G) upon which is placed a compression clamp (H). The mouth of the one liter bottle is made air tight by a two-hole rubber stopper (I). The inlet of the siphon flow meter (C) is passed through one hole of the two-hole rubber stopper and a glass "Y" tube is passed through the other. The glass "Y"

*Read in abstract at a meeting of the New York Obstetrical Society, January 9, 1923.

tube is connected one way with the mercury manometer (E) by pressure tubing (L) and the other way with the intrauterine canula (F) by pressure tubing (M) leading to the intrauterine canula.

By use of this apparatus the following important details in the technic can be accurately controlled and a maximum amount of information obtained from examination:

1. A constant low pressure of gas can be automatically maintained by the reducing valve (B).

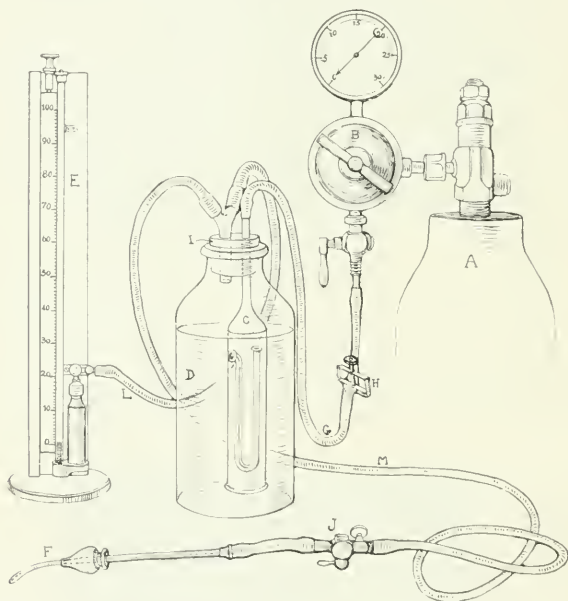


Fig. 1.

2. The rate of flow of the gas can be accurately regulated by means of the compression clamp (H) on pressure tubing (G).

3. The volume of gas which passes into the abdomen can be measured by the siphon flow meter (C).

4. Intrauterine pressure can be recorded by means of the mercury manometer (E).

In this study cases were classified as patent, partially occluded, or occluded according to the level of intrauterine pressure at which gas passed through the fallopian tubes into the abdomen. For the purpose of this study the levels of pressure suggested by Rubin were adopted. That is:

1. If gas passed into the abdomen at an intrauterine pressure below 150 mm. the tubes were considered patent.
2. If a pressure of 150 mm. or more was required before gas passed into the abdomen the tubes were classified as partially occluded.
3. Manometer readings of 200 mm. on repeated trials were considered to indicate occluded tubes.

These levels of pressure for the classification of cases depend upon one very important point in technic, namely, the rate of flow of the gas. Any slow rate of flow may be safely used but levels of pressure indicating patent or partially occluded tubes must be determined for the rate of flow of the gas used during the examination. That is, during inflation of the uterus and tubes gas is allowed to accumulate under pressure in an enclosed chamber, the uterus, which has a narrowed outlet represented by the tubes. Practical experience has shown that, when the gas flows at a very slow rate, a drop in the intrauterine pressure, indicating that gas has passed into the abdomen, occurs at a lower level than when the gas is allowed to flow at a more rapid rate. As stated above the tubes were classified as patent, or partially occluded according to the level at which the pressure fell. The necessity for adopting a known uniform rate of flow of the gas to determine the condition of the tubes is therefore apparent. In this series a rate known as 20 to 100 suggested by Rubin was adopted. This rate of flow of the gas is obtained before the examination is begun. To obtain this rate of flow—

1. Regulate the reducing valve (B) so that it will maintain ten pounds of pressure.
2. Close the release valve (J) making the pressure system air-tight.
3. Adjust the rate of flow by means of the compression clamp (H) so that a pressure of 100 mm. will accumulate in 20 seconds as indicated by the manometer.
4. The release valve (J) is then opened until the canula is adjusted in the cervical canal.

In this way the exact rate of flow of the gas can easily be obtained before the examination is begun. It is a much more accurate method to determine the rate of flow than to count the number of pulsations or excursions of the gas in the siphon flow meter.

The technic of the examination has been kept as simple as possible. The patient is examined in the lithotomy position. Exposure of the cervix is obtained with a bivalve speculum. The cervix and cervical canal are painted with 3.5 per cent iodine. The anterior lip of the cervix is grasped crosswise with a bullet forceps in order to leave the canal unobstructed. The intrauterine canula is then inserted into the canal. The rubber syringe tip which has been placed over the end of the canula is made to fit into the canal as firmly as

possible, by gentle downward traction on the cervix with bullet forceps. The screw release valve is then closed and the manometer will immediately begin to register intrauterine pressure.

We have three ways of knowing whether gas has passed into the abdomen during examination:

1. Pressure findings:—A drop in intrauterine pressure during the examination, if there has been no leak around the canula in the cervix, means that gas has passed through one or both tubes. An intrauterine pressure of 200 mm. on repeated trials indicates that both tubes are closed.

2. Shoulder pain:—As soon as the patient assumes the upright position she may have pain in one or both shoulders. This symptom is present in over 90 per cent of the cases in which gas has passed into the abdomen and is very positive evidence that the tubes are patent.

3. Fluoroscopic examination:—If a patient is examined in the upright position with the fluoroscope after gas has passed into the abdomen a layer of gas can easily be seen beneath the diaphragm.

At first all cases were routinely examined with the fluoroscope to determine whether gas has passed into the abdomen. This was later given up except in cases where the patient had no shoulder pain. Many patients are very apprehensive and fear examination on account of the pain which it may cause. Most patients do have some discomfort during the examination. As soon as they assume the upright position a high percentage of the cases in which gas has passed into the abdomen have shoulder pain which may be rather severe. If they are then taken into the dark room for fluoroscopic examination a certain number will faint as a result of fear and shoulder pain. After 200 cases had been insufflated and routinely examined with the fluoroscope it was decided that if a definite drop in intrauterine pressure during the examination was followed by shoulder pain, no further proof that gas has passed into the abdomen was necessary. It is undoubtedly advisable to examine patients with the fluoroscope if a drop in pressure occurs which is not followed by shoulder pain.

The volume of gas which has passed into the abdomen can easily be measured by counting the number of pulsations or excursion of the gas in the siphon flow meter. Forty cubic centimeters of gas pass into the abdomen with each excursion. About 240 c.c. of gas are used during an examination. Carbon dioxide is absorbed so rapidly from the abdomen that symptoms from the amount used in the ordinary examination disappear after fifteen to thirty minutes.

Patients have not been examined in the presence of profuse purulent or bloody vaginal discharge. Examination should not be at-

tempted in patients who have acute pelvic inflammatory disease or serious organic heart disease.

Too much reliance should not be placed on one examination if pressure findings indicate any degree of obstruction to the passage of gas through the tubes. The results of an examination, when a patient is near her menstrual period, are not reliable. She should not be examined within one week before or after her period. The congestion of menstruation may cause partial or complete obstruction of the tubes. Although a patient's periods may be normal and regular almost every woman has irregular periods at some time during her menstrual life. Therefore we can never be absolutely sure at one examination that we are not too near a menstrual period. For some reason certain cases will be found occluded at one examination and patent at subsequent examinations. If we find the tubes obstructed at one examination and we can find no cause for the obstruction, the patient should be examined at least twice more on different occasions before a definite decision is made in regard to patency of the tubes.

The test has been used mainly for four purposes:

1. To determine the patency or nonpatency of the fallopian tubes in cases of sterility.
2. To determine the patency or nonpatency of the fallopian tubes as an indication of their involvement in chronic pelvic inflammatory disease or other pelvic pathology when the diagnosis has been uncertain by bimanual pelvic examination.
3. To assist in keeping the tubes open following conservative operative procedures.
4. To determine the ultimate success of operative procedures for opening obstructed tubes.

The results of 600 cases which were examined can be classified as follows:

Primary sterility cases	236
Secondary sterility cases	119
Cases with indefinite pelvic conditions	112
Cases having laparotomies after insufflation	108
Cases examined after pelvic operations (follow-up cases)	25

An analysis of the results of insufflation in 236 cases complaining of primary sterility is as follows:

Tubes patent in 79 cases or 33.4 per cent.
Tubes partially occluded in 69 cases or 29.1 per cent.
Tubes occluded in 88 cases or 37.2 per cent.

In other words 66.5 per cent of the patients complaining of primary sterility had either partial or complete tubal obstruction.

The bimannual pelvic examinations were negative in 44 per cent of the primary sterility cases.

Of the primary sterility cases with negative bimannual examinations, 29.5 per cent had either partial or complete tubal obstruction.

An analysis of the 119 cases of secondary sterility is as follows:

Tubes patent in 56 cases or 47 per cent.

Tubes partially occluded in 26 cases or 21.9 per cent.

Tubes occluded in 37 cases or 30 per cent.

Of the secondary sterility cases 17.4 per cent had either occluded or partially occluded tubes in spite of negative bimannual pelvic examinations.

These statistics point out definitely the value of the method for the diagnosis of a frequent cause for female sterility. It was rather surprising to find the tubes partially or completely obstructed in such a high percentage of sterility cases in which the physical examinations were negative.

The patency of the tubes was studied in 112 cases to determine whether they were involved in chronic adnexal disease. The results were as follows:

Tubes patent in 54 cases or 48.2 per cent.

Tubes partially occluded in 20 cases or 17.8 per cent.

Tubes occluded in 38 cases or 33.8 per cent.

Of the cases with partially occluded or occluded tubes 18.9 per cent had negative bimannual examinations.

The cases having laparotomies following insufflation may be analyzed as follows:

Twenty-one (21) cases were operated for retroversion in which the tubes appeared to be normal. Although the tubes appeared to be normal, 42.8 per cent showed partial or complete tubal obstruction before operation. This undoubtedly explains why certain cases of retroversion are sterile. Insufflation would help to indicate which of these cases should be operated although they are free from symptoms other than sterility.

Other cases in which the results of insufflation were checked at operation included:—

31 cases of chronic pelvic inflammatory disease

36 cases of retroversion complicated by chronic pelvic inflammatory disease

10 cases of fibrosis uteri or small multiple fibroids

4 cases in which the tubes were convoluted and of the infantile type.

A large percentage of the pelvic inflammatory cases had definitely occluded tubes at operation. The cases which showed the tubes to be partially occluded when examined by the Rubin method proved

to have either one tube open and one closed or both tubes kinked or partially occluded by pelvic adhesions. In certain cases the tubes appeared normal except for congestion. It is possible to have rather marked peritoneal adhesions which do not obstruct the fimbriated ends of the tubes or occlude them by congestion or kinking.

In myomatous uteri the tubes may be partially or completely obstructed without showing disease at operation.

Three out of four of the cases in which the tubes were convoluted and of the infantile type showed complete occlusion when examined before operation.

Insufflation showed the tubes freely patent in three cases operated for right salpingitis and in two cases operated for bilateral salpingitis. Appendicitis caused the symptoms in two of the cases, a unilateral cystic ovary in one case and bilateral cystic ovaries with varices of the broad ligaments in two cases.

As stated above cases were classified as patent, partially occluded or occluded according to the level of pressure at which gas entered the abdomen. It was found early in this study, when cases were examined at operation after insufflation, that a definite single level of pressure could not be obtained, below which it could be said that tubes were normally patent and above which it could be said that some obstruction existed. One fact which was uniformly very striking was that tubes were very easily obstructed. Any condition which produces congestion of the pelvic organs such as menstruation, uterine displacements, pelvic inflammatory disease, myomata uteri, fibrosis uteri or ovarian neoplasms may cause partial or complete obstruction of the tubes. It was assumed for this reason that it would be possible to find a very low level of pressure which would indicate that both tubes were not only patent but normal. On the other hand, if a high level of pressure were required on repeated examinations before gas entered the abdomen, some obstruction must be present. Although the series of cases operated following insufflation is still small, the findings indicate that—

1. If gas passes into the abdomen at an intrauterine pressure of 100 mm. or below at 20 to the 100 rate of flow, we may be sure that both tubes are patent and normal.

2. If an intrauterine pressure of 150 mm. or more is required on repeated examinations before gas enters the abdomen, we may be sure that some cause for obstruction exists whether it can be felt by bimanual examination or not.

3. When gas enters the abdomen between 100 mm. and 150 mm. of intrauterine pressure, we must combine our pressure findings with other means of diagnosis to determine the condition of the tubes.

It is interesting to note in this series of 600 cases that gas entered the abdomen:

At 100 mm. or less of intrauterine pressure in 142 cases or 23.6 per cent.

Between 100 and 150 mm. intrauterine pressure in 91 cases or 15.3 per cent.

Between 150 and 200 mm. intrauterine pressure in 157 cases or 26.1 per cent.

The tubes were occluded in 210 cases or 35 per cent.

In other words we could be reasonably certain that both tubes were normal in 23.6 per cent of the cases and that there was some cause for partial or complete obstruction in 61.1 per cent of the cases. The percentage of cases in which gas entered the abdomen between 100 and 150 mm. was small, 15.3 per cent. This represented the cases in which the method did not give definite information as to the condition of the tubes.

As stated above, the tubes are very easily obstructed. Therefore when we find them freely patent we may be quite sure that they are also normal. If any obstruction is present at repeated examinations, some cause for obstruction is also present, whether we are able to find it or not by physical examination. As seen from the above statistics the method was of definite value in determining the condition of the tubes in 84.7 per cent of the cases examined.

There are undoubtedly conditions which obstruct the passage of gas through the tubes which cannot be seen when the tubes are examined at operation. This is particularly true in the presence of uterine displacements. As noted above 21 cases were operated for uncomplicated retroversion in which the tubes appeared to be normal, although 42.8 per cent showed partial or complete tubal obstruction when examined before operation. It has frequently been observed that cases examined too near a menstrual period had partially or completely obstructed tubes. If the same cases are examined at a later date well away from their periods, the tubes are normally patent and would probably appear normal to inspection. It is obviously impossible to say that tubes are patent because they appear normal to inspection.

A summary of the examination of twenty-five cases following pelvic operations, "follow-up cases," is as follows:

Both tubes removed, 5 cases, partially occluded, 3, occluded, 2.

One tube removed, 4 cases, partially occluded 2, occluded 2.

Both tubes resected, 4 cases, occluded, 4.

One tube resected, 3 cases, patent, 1, partially occluded, 2.

One tube removed and one tube resected, 4 cases, occluded, 4.

Salpingostomy, bilateral, 2 cases, occluded, 2.

Cases operated for adherent retroversion, 3, patent, 1, partially occluded, 2.

This very small series seemed to indicate in the cases examined that where the tubes were seriously enough involved to require bilateral resection, bilateral salpingostomy or the removal of one tube and

resection of the other, operation failed to open them or to keep them open. A total of ten such cases was examined and all were found occluded. It is also interesting to know that gas entered the abdomen in three out of five cases that had had bilateral salpingectomy.

The test has been used to follow cases of acute pelvic inflammatory disease treated nonoperatively. One case was confined to the hospital for seventeen days with severe pelvic pain, temperature and leucocytosis. Examination at that time showed bilateral tender pelvic masses. She was insufflated one year later when she was entirely free from symptoms. The pelvic examination was negative and the tubes were found freely patent.

A small number of cases were insufflated at intervals following conservative operative procedures on the tubes. These cases were insufflated in order to prevent the tubes from becoming closed by adhesions as they healed. In the small number of cases followed the results have not been encouraging. In three cases the tubes were patent after operation but gradually closed as shown by subsequent examinations.

It has been of considerable interest to follow the sterility patients who had been insufflated to see if conception would result, from opening obstructed tubes. Nine persons who were insufflated, subsequently became pregnant. Other pregnancies may have occurred in cases which we have been unable to follow. The histories of the cases which became pregnant may be briefly summarized as follows:

1. Mrs. A. K., No. 22866 age twenty-nine, married three years. Never pregnant. Dysmenorrhoea. Anteflexed uterus and endocervicitis. Date of insufflation, August 10, 1921, maximum pressure, 115 mm. Last period before pregnancy October 17, 1921. Last visit to the clinic, February 16, 1922, then four months pregnant.

2. Mrs. A. L., No. 27979. Age twenty-one, married six years. Never pregnant. Leucorrhoea, marked endocervicitis. Date of insufflation, May 4, 1921. Maximum pressure 104 mm. Operation May 9, 1921, tracheloplasty, Sturmdorf. Pregnant three months after operation. Examined nine months after operation. Uterus was then the size of six months pregnancy, fetal heart heard.

3. Mrs. E. L., No. 27227. Age twenty-five years. Married four years. Never pregnant. Pain in both lower quadrants. Operation February 4, 1921, appendectomy, separation of peritoneal adhesions. Date in insufflation December 28, 1921. Maximum pressure with each of first two trials, 250 mm. Gas passed into the abdomen at 180 mm. with the third trial. Last menstruation May 15, 1922. Patient last seen in clinic September 27, 1922. She was then four months pregnant.

4. Mrs. M. M., No. 27599. Age thirty-two. Married eight years. Had had five induced abortions, the last three years ago. Complaints, sterility and leucorrhoea. Endocervicitis. Operations, March 17, 1921, tracheloplasty, Sturmdorf. March 13, 1922, dilatation and curettage; resection of tube, right; removal of parovarian cyst, right. Date of insufflation September 1, 1921. Maximum pressure 120 mm. Patient was referred to the Obstetrical Department, January 10, 1923, four months pregnant.

5. Mrs. C. S., (Private Case), Age thirty. Married eight years. One full term child delivered by forceps one year after marriage. Complaint, sterility. Laceration of cervix and right adnexal disease. Date of insufflation May 4, 1921. Maximum pressure 178 mm. Patient became pregnant after her next menstrual period and has since been delivered.

6. Mrs. D. S., No. 25965. Age twenty-six. Married eight years. One full term child one year after marriage. Complaints, sterility, backache, leucorrhoea, pain in lower abdomen. Operation June 26, 1920, plastic on cervix and pelvic floor; resection of left tube; separation of adhesions; appendectomy; operation for retroversion (Simpson). Date of insufflation December 21, 1921. Maximum pressure 190 mm. Patient was examined and found five and a half months pregnant on September 20 1922.

7. Mrs. E. C., No. 24683. Age twenty-two. Married six years. One full term child one year after marriage. Complaints, sterility, dysmenorrhoea and backache. Laceration of cervix and bilateral salpingitis. Date of insufflation December 7, 1922. Maximum pressure 160 mm. Operation January 26, 1922, dilatation and curettage. Patient is now eight months pregnant and will be delivered in the hospital this month.

8. Mrs. G. C., (Private Patient). Age twenty-eight years. Married four years. Never pregnant. Insufflation maximum pressure 110 mm. Patient became pregnant two months after insufflation and is to be delivered in the hospital about January 15, 1923.

9. Mrs. L. B., (Private Patient). Age twenty-eight years. Married six months. Never pregnant. Date of insufflation December 17, 1921. Maximum pressure 70 mm. Husband normal. Patient became pregnant one month after insufflation and has since been delivered of twins.

From the histories of these cases it is very difficult to determine whether we can credit the method with any of the pregnancies which have occurred. Certainly the method had a therapeutic value in only a very small percentage of cases.

A study of the Rubin method was undertaken to determine whether it was a safe, practical diagnostic procedure. When patients were being routinely examined with the fluoroscope, fainting occurred in several cases. One patient who was a chronic epileptic developed a seizure of short duration immediately following insufflation. The fact that 600 cases have been examined without any serious casualty proves that the method is reasonably safe. The technic of the test is simple. The discomfort to the patient is not great when the examination is carefully done.

CONCLUSIONS

1. The Rubin method for the determination of tubal patency is a simple, safe, diagnostic procedure.

2. If details in technic are carefully controlled we can form a definite opinion as to the condition of the tubes in approximately 85 per cent of the cases examined.

3. Patients should not be examined when near a menstrual period or in the presence of acute pelvic inflammatory disease or serious organic heart disease.

4. All cases of sterility, in which a definite diagnosis of the cause cannot be made by bimanual pelvic examination, should be insufflated.

5. Conditions which accompany menstruation, uterine displacements, ovarian and uterine tumors may cause partial or complete tubal obstruction and yet not be apparent to inspection at operation.

6. The method is almost entirely diagnostic. Pregnancy follows insufflation in only a very small percentage of cases.

7. Operative procedures which are done to open tubes or to keep them open in cases where both tubes have been involved in an inflammatory process, fail in a very high percentage of cases.

I wish to acknowledge my indebtedness to Dr. George Gray Ward, Chief Surgeon of the Woman's Hospital, for the opportunity to establish a clinic for the study of these cases.

BIBLIOGRAPHY

Rubin, I. C.: Jour. Am. Med. Assn., Sept. 4, 1920, lxxv, 661-666; Am. Jour. Roentgen., August, 1921, viii, No. 8, pp. 459-461; Am. Jour. Roentgen., March, 1921, viii, No. 3, pp. 120-128.

(For discussion, see p. 112.)

FIBROID TUMORS COMPLICATING PREGNANCY AND THEIR TREATMENT*

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I AM tempted to present my subject to this Society not because I have anything new to offer, but simply to reiterate by a word of caution the need of closer attention to pregnancy associated with fibroid tumors of the uterus. The great variation in the distribution of these tumors, their behavior during pregnancy, the differences in their histologic character and their clinical features before, during, and after labor, have combined to contribute to medical literature a great variety of personal opinions as to the course to be followed. On the one hand we find extreme conservatism combined with a desire to leave the case to Nature's ministrations. On the other, but much less frequently, we meet with a radical trend of thought which advocates removal of the tumor or of the pregnant uterus as the only salvation. Between these two extremes are other views couched in more moderate language. Personally, I must confess a fear in the presence of this condition that has not been alleviated by a consid-

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erable experience. I am frank to confess that the presence of a fibroid tumor associated with pregnancy fills me with doubt and uncertainty until a period of at least three or four months has elapsed after delivery. While it is true that Nature is able in many cases to handle the complication satisfactorily, both from the mechanic or physiologic and histologic standpoint, the uncertainty which attaches to each particular case calls for very careful supervision and a readiness to interfere when the occasion arises.

We may divide fibroids associated with pregnancy into two general classes. In the first, the tumor is myomatous or fibromyomatous, situated in the wall of the uterus and participating in its development with the muscle cells of that organ. No involvement of the endometrial lining need occur in such cases and the presence of the growth in the uterus may merely constitute an obstruction to labor, which is often overcome by the natural forces. In the second group of cases the tumor invades the endometrium with the production of irregular bleeding, or its orderly growth indicates exacerbation with the production of a marked hyperemia in the tumor itself, accompanied by pain; or degeneration takes place in its substance with the production of a possible sepsis, either during pregnancy or after labor. Although such a theoretical classification is possible, the clinical diagnosis is often surrounded with difficulties and an apparently harmless growth during pregnancy may suddenly take on characteristics that endanger the life of the patient. For this reason all such women should be kept under most careful observation during pregnancy, and the occurrence of either pain or hemorrhage should at once call for rest in bed and if possible, sojourn for further observation in a hospital.

Authorities vary as to the pathologic processes which take place in these growths insofar as actual degeneration is concerned, but enough case reports are now on hand with careful histologic examinations, so that we must accept the process of necrosis of fibroids during pregnancy as a possibility. If we can make a diagnosis of degeneration a waiting course is surrounded with danger because of the complications arising from a possible intraperitoneal rupture or an extension of the infection to other places.

It is generally accepted that delivery by the normal forces will occur in the majority of cases and statistics seem to bear out this assumption. Apparently it is only the exceptional instances in which rapid growth of the tumor with possible degeneration, pain, or bleeding, calls for operative interference. Most women with uterine fibroids are said to go through pregnancy without symptoms. Yet from personal observation and experience I feel that interference should not be delayed if pain, bleeding, or fever—either alone or to

gether—develop at any period of pregnancy and do not subside readily and promptly with rest in bed.

In 1911 R. W. Lobenstine reported a series of 100 cases of fibroid tumors in pregnancy from the Lying-In Hospital service and of these 85 went to term, but 21 required operative delivery. Eliminating 10 low and median forceps deliveries, this left 3 versions, 2 high forceps, 4 cesarean sections and 2 Porro operations. Myomeectomy was only done twice in the series; once in a primipara at the fifth month who aborted the next day, and another, also a primipara, at the third month, who delivered herself spontaneously at term. Suppuration in fibroid tumors was diagnosed in 6 cases postpartum with one death, but as there were three other deaths in the series, it is probable that gangrene with extension of the sepsis took place in some if not all of the other cases. During the first four weeks after delivery a complete hysterectomy for sloughing of the myoma was done in 3 cases and vaginal myomectomy in four others; whether operation was done subsequently in the others is not stated. A maternal mortality of 4 cases in 85 in which shock and sepsis were stated to account for death in 3 and intestinal obstruction during the puerperium in the fourth, must be accepted with some hesitancy as a satisfactory result.

Since the compilation of this report the writer has had a personal experience with a considerable number of cases in private and hospital practice and in view of his observations is less inclined to look with equanimity on this complication, although Pinard in 1904 stated that 64 per cent of his cases were delivered spontaneously and Troell reports 68 per cent. F. W. Lynch in a recent text-book on pelvic neoplasms accepts these and other figures as a favorable indication for noninterference. It has seemed to me, however, that the general complacency in the presence of fibroid tumors of the uterus that are associated with pregnancy, is not a favorable or safe attitude for the profession to assume. A mortality of over 4 per cent reported by Lobenstine, and which can probably be duplicated in other series of cases, should not be accepted without comment, especially as the cause of death in each instance was due to sepsis. Myomectomy during pregnancy is usually decried, and Lynch, for example, states that "it appears to him as a surgical curiosity with rather a narrow field for the treatment of fibroids complicating pregnancy, because it is most difficult to perform successfully in the class of cases in which interference is more frequently demanded, namely, pelvic impaction; as well as the fact that subsequent adhesions are almost the rule, and there is the ever present possibility that the scar may rupture during labor in the event that the case escapes abortion and comes to term." I fully agree with him that compelling indications are necessary, but judgment must be exercised in determining when these

indications have reached the limit of tolerance on the part of the patient. It is not possible to state definitely in any one case just when interference should be practiced before term. But if a tumor becomes large enough to cause pain or obstruction, or fever, or bleeding, it should be removed if enucleation is possible, or a hysterectomy should be done. If the pregnancy has advanced sufficiently far to permit of the delivery of a living child by cesarean section or otherwise, this decision should be made before term, because the nutrition of the fetus is often interfered with by placental separation in fibroid uteri. Where the growth is impacted in the pelvis a myomectomy may be difficult, but where the tumor is above the pelvic brim myomectomy can usually be done with good results and abortion avoided by thoroughly narcotizing the patient for several days after delivery.

There is another accident of likely occurrence of which an instance has come to my attention recently, to be detailed further on. I refer to rupture of the lower uterine segment where fibroids are present in this region. It is also possible that many cases of so-called spontaneous rupture of the uterus may have unrecognized fibroids as the basis for the accident.

The recital of certain typical cases of fibroids associated with pregnancy may serve to demonstrate more effectually my contentions as outlined and serve as salient factors in the conclusions which I present.

Pregnancy in a Uterus After Myomectomy, with Subsequent Delivery. Mrs. R. N.—Had an abdominal myomectomy done in November, 1916. She married subsequently and her first baby was born in January, 1919, at the Lying-In Hospital, with a forceps delivery. She apparently made an uninterrupted recovery. Her menstruation was regular, moderate in amount and she became pregnant again the latter part of 1922 and went along without much difficulty except for attacks of left sided pain which were relieved by lying down. No tumor could be palpated. She was more or less asthmatic, however, all through this pregnancy and was finally delivered at the Lying-In Hospital in August without any difficulty. The placenta was not expelled three hours later and as there was more or less bleeding a manual extraction was done. It was found firmly adherent over at least one-half its area to the anterior wall of the uterus, evidently in the region of the scar. The puerperium was marked by a very slow involution of the uterus with considerable bleeding. Her asthma becoming very much worse, the patient failed to report for observation and treatment of her pelvic condition and I did not see her again until January of this year (1923), when she stated that she had menstruated at monthly intervals since the birth of the child but very much more profusely. Her last period began about January 11th and was much more abundant than usual. On the afternoon of January 18th she discharged what she described as a very large, hard, blood clot and experienced severe cramp-like pains in the uterus. When seen by me shortly afterward the patient presented a markedly exsanguinated appearance, with a weak pulse and was in the midst of an asthmatic attack. Examination showed the uterus anteverted, about the size of a three months' pregnancy and hard but with a soft cervix which was sufficiently dilated to admit one and one half fingers. A considerable mass of broken down tissue, without odor, was removed with the finger and it is very probable that a fibroid tumor had been

passed. An exploratory curettage was done the next day and the cervix found to have contracted down since the previous examination. The uterine cavity was about five inches deep and at least a tablespoonful of broken down muscle tissue was removed. The patient's blood count before operation showed 3,500,000 red cells with numerous poikilocytes, a color index of 5, hemoglobin content 35 per cent. Preparations for transfusion were made and in view of the patient's asthma, care was taken to guard against any anaphylactic shock. Both the donor and the patient were starved for six hours and about 600 c.c. of blood by the direct syringe method was given. The patient had a moderate chill that night and the following night another chill with severe dyspnea and cyanosis, a weak thready pulse and went into collapse. She recovered within an hour after thorough stimulation but had another attack about a day later, though less severe. The hemorrhage was checked. After this improvement was rapid and an examination on January 29th showed the uterus still about the size of a three months' pregnancy but quite hard, nodular, and the cervix firmly closed.

Comment.—The course of this case shows that a patient with a fibroid uterus should be kept under the closest possible observation even though she has gone through an uneventful pregnancy after a previous myomectomy. The slow involution after the second pregnancy pointed undoubtedly to the presence of other fibroids that were not immediately diagnosed but would undoubtedly have been detected had subsequent examinations of the patient been made.

A similar case with a more satisfactory outcome was that of Mrs. S., a para-ii, who came to me early in her second pregnancy with a fibroid tumor distinctly palpable in the lower uterine segment anteriorly. A steady enlargement of the growth occurred until she went into labor at term, when it was at least six inches in diameter but had been displaced above the brim. Delivery by the natural forces progressed until the head reached the outlet when a low forceps operation was done. At the time of discharge from the hospital, two weeks later, the mass could be distinctly felt in the lower uterine segment but there was no bleeding. During the next two weeks there were slight occasional hemorrhages and a rather foul discharge. When seen about a month later the patient had had a severe chill and examination showed the cervix two fingers, dilated with a rounded mass occupying the lower uterine segment. The patient was kept in bed and given small doses of ergot. Within twenty-four hours strong uterine contractions expelled a tumor as large as an orange into the vagina from which it was manually removed. The patient ran a moderate fever for several days and then involution proceeded quite promptly.

The fact that pregnancy can proceed in a uterus which has been subjected to a myomectomy is well shown by the case of Mrs. N., already detailed and also by that of Mrs. R., a doctor's wife, 31 years of age, who had her first baby after a moderately hard labor, which was terminated by forceps. The child died two weeks later in coma. The puerperium was free from fever but a foul lochia persisted for three weeks and there was considerable sloughing of the perineum. During this pregnancy the patient had a great deal of pain on the left side of the uterus and an attack of influenza with pneumonia developed during the sixth month. There was marked albuminuria. When first seen by me, about ten weeks after her confinement, she presented a subinvolved uterus with a distinctly palpable fibroid on the left side. The patient was very desirous of having a child but in view of the undoubted fibroid condition of the uterus with its accompanying symptoms, I

advised against her becoming pregnant until after an exploratory reparative operation. This was done in June, 1920. The very much eroded and lacerated cervix was satisfactorily repaired with a Sturmdorf tracheloplasty and a simple Hagar perineorrhaphy was followed by laparotomy. Exploration showed the uterus enlarged to the size of a grapefruit with a soft rounded mass projecting from the fundal region and a much softened cystic mass in the region of the right cornu which extended down between the layers of the broad ligament. An hysterectomy seemed indicated but in view of the patient's age and great desire for offspring, it was deemed advisable to do a less radical operation. Both tubes were normal, likewise the ovaries. The two well marked tumors were then enucleated with considerable difficulty and the patient made a fairly rapid and satisfactory recovery from the operation. The wounds healed by primary union and a later examination showed the uterus freely movable, small, hard, and the subsequent periods although somewhat irregular were much less profuse than formerly. There was no exacerbation of the patient's nephritis as the result of this operation and when seen again in October, 1921, she was pregnant about five months. Aside from some discomfort the patient had a moderately satisfactory pregnancy and went into labor spontaneously January 30, 1922. This was terminated by an easy low forceps. Baby cried vigorously, and weighed over nine pounds. The placenta was expressed by Credé without any subsequent hemorrhages. The uterus involuted very satisfactorily and several months later was found in an anteverted position, freely movable and no evidences of any fibroid tumors present. The cervix did not show any fresh lacerations or erosions. Aside from a slight adnexal tenderness on the left side, the patient was in good condition so far as her pelvis was concerned. The baby unfortunately died when eight weeks old from an intracranial hemorrhage that was apparently of hemophilic origin. The patient was seen again a few weeks ago and is now several months' pregnant. This case shows that even an extensive resection of the uterus with the removal of several fibroids is capable of satisfactorily undergoing the strain of pregnancy and labor.

In contrast to the conservative treatment of the cases noted is that of Mrs. B., a woman 40 years of age, with five living children, who was admitted to the Lying-In Hospital in November, 1922, with a history of irregular bleeding after a period of amenorrhea beginning in August and accompanied by pain and a marked secondary anemia. Examination showed an abdominal tumor extending above the umbilicus, irregular in outline and consistency. The upper part was soft and the patient claimed she felt life. Examination showed a rather emaciated woman, very pale, and bleeding moderately from the cervix. The case seemed to call for radical treatment and after keeping the patient in bed for over a week, an abdominal operation was undertaken. The tumor mass was found to be the size of a seven months' pregnancy, the upper portion being cystic and thinned out with a contained fetus and the pelvis filled up with numerous hard, fibroid masses. A complete hysterectomy was done, which was rendered difficult by the many and large veins in the broad ligaments which gave rise to considerable hemorrhage. The patient made a fairly good recovery and the wound healed by primary union but during the course of the second week she developed a thrombosis in the right leg and a few days later well marked evidences of an infarct pneumonia. From all of this she recovered and when discharged about a month later had improved greatly although she still had some trouble in manipulating her right leg. In this case the woman's age and the situation of the pregnant portion of the uterus above the fibroid mass precluded any palliative operation. Constant bleeding for several months had produced such a marked secondary anemia that no other course could be considered.

That pregnancy may continue to term without interruption after intrapartum

myomeetomy is well shown by two cases that I have already reported in a previous communication (New York State Medical Journal, August, 1922). The first of these was Mrs. E., a para-i, admitted to the Lying-In Hospital in August, 1915, seven months pregnant and complaining of marked pain and tenderness in the left side of the abdomen which had been present for several weeks. At various times slight vaginal bleeding was noticed and moderate elevation of temperature was present and the patient seemed very uncomfortable. An exploratory laparotomy was done, based on the probable diagnosis of fibroid tumor with possible degeneration. The round vascular tumor in the region of the left cornu was readily shelled out, it being of the subperitoneal type and the endometrium not being involved. Prompt and satisfactory union occurred and the patient went to term and was subsequently delivered elsewhere without difficulty.

The second case, a Mrs. W., was admitted to the Lying-In Hospital with a history of a five months' pregnancy. She complained of severe abdominal pains and the examination showed an irregularly enlarged uterus, with a tense bulging mass in the culdesac; a moderate elevation of temperature and leucocytosis was present. Exploratory laparotomy based on the probable diagnosis of fibroids complicating pregnancy showed the uterus enlarged to the size of six and one-half months. On the left side anterior to the broad ligament was a firm ovoid tumor attached by a broad base to the uterine wall, the central portion of which was soft and apparently ready to break through the serous covering. This was excised and another tumor as large as the closed fist was found firmly impacted in the pelvic brim. The uterus was entirely delivered out of the abdominal cavity and the tumor excised with difficulty. Another smaller tumor was removed from the anterior surface of the uterus after which the organ was replaced in the abdomen. Notwithstanding the handling to which the uterus had to be subjected, it was not thought advisable to do a hysterectomy, for even if abortion occurred, the patient would still have her uterus for another perhaps more successful gestation later on. The patient made an excellent recovery and went into labor spontaneously at term, delivering herself without any assistance. The uterus involuted satisfactorily and the patient was seen within a few months and found to be in excellent condition—the uterus small and not showing evidences of further fibroid growth. The report of the specimens removed showed necrosis of the central portions of all the tumors and had this patient been allowed to go on she would undoubtedly have developed a serious intra-abdominal condition.

These cases are each examples of the various types of fibroid tumors complicating pregnancy that are commonly met with. Since the publication of Lobenstine's figures, I have gone over another series of histories from the service of the New York Lying-In Hospital in which there were records of 114 cases with fibroid tumors of sufficient size to be noteworthy. These are the histories of 33269 confinements including abortions and postpartum cases of less than ten days, admitted to the In-Door Service from January 1, 1912, to January 1, 1923. In some of these cases the diagnosis of fibroid was not made until after delivery and constituted no obstruction or interference with labor.

My study of these cases is more or less superficial but I shall subject them to closer scrutiny at a later period. The proportion of

fibroids complicating pregnancy noted in the period of eleven years is approximately 0.034 per cent. I was rather surprised to find that the total number of cases with this complication that were entered during the last two years amounted to 38; whereas in the previous eight years there were only 76. Whether this was due to the increased service, or whether more cases of this kind were referred to us, I am not yet prepared to say. Out of the total number there were 51 cases that delivered themselves without operative interference and in the remainder (63), forceps operations were done 13 times (including one high forceps), and version seven times. There were 21 cases in which cesarean sections were done, including four of the number that presented contracted pelvis. The operation was combined with myomectomy in 9 instances and a complete hysterectomy was done in one. In this series of cesarean there was one death from postoperative pneumonia. There were two vaginal cesarean sections done with myomectomy, of which one recovered and the other died from shock. Abdominal hysterectomy after labor was done in two cases, and during pregnancy in one. Craniotomy was done twice, in both instances on the after-coming head after version with breech extraction. Induction of abortion was done in two cases, once with a myomectomy. There is also a record of a manual dilatation with version and breech extraction with death of the mother, and another death resulted in a spontaneous delivery from cerebral hemorrhage. This gives us a total of four deaths of mothers which may be attributed to operation.

Certain other facts elicited in this series are of interest. Placenta previa associated with a fibroid uterus was noted in five cases and manual extraction of the placenta was done 11 times. Fever, or a temperature above 100.4 for over twenty-four hours, was present in 21 cases. The condition was associated with toxemia in four instances, one of which was an eclamptic. Displacement of the fetal parts was noted in 17 cases, including three prolapsed cords. There were three instances of twin pregnancy in the series, in one of which delivery was done by cesarean section. Syphilis was diagnosed in four cases. Regarding the babies it is to be noted that there were 23 cases of premature delivery and 15 stillbirths. Abortion (from three to five months) occurred in 11 cases.

It must be admitted that the figures quoted are rather disquieting and are not quite as favorable as those from other clinics in which similar cases were studied.

Guggisberg (*Necrosis of Myomas During Pregnancy*, *Schweiz. med. Wochenschr.*, April 28, 1921, 51, No. 17) reported a series of 16 cases occurring in his clinic during a period of eight years from 1912-1920 in which operative interference was found necessary and a total hysterectomy done without a death. In seven necrosis was present.

Heimann (*Monatschr. f. Geb. u. Gyn., May, 1921*), reporting in a clinical article the myoma cases from Küstner's clinic in Breslau during recent years, found a total of 12 cases in which the myoma was of noteworthy size. Abdominal enucleation for symptoms was done six times with four resulting abortions. The expectant treatment was followed in the remaining six cases and four delivered spontaneously. There was no maternal or fetal mortality in this group.

Attention must be called to the fact, however, that many of these women were referred to the Lying-In Hospital by outside physicians because the fibroids were the cause of a dystocia, and undoubtedly the growth of the service in this particular hospital contributed to the increased number.

CONCLUSIONS

(1) The presence of uterine myoma and fibromyoma during pregnancy calls for the most careful observation for evidence of local necrosis and if this is diagnosed by the presence of fever and an increased white-cell count, operation should be considered—either a myomectomy or hysterectomy. (2) Where a tumor is situated in the lower uterine segment and may possibly interfere with delivery, operative interference should be considered if the tumor fails to rise out of the pelvis during the last two weeks before labor, or in the early stages of this process. (3) Exploratory operation is always possible and myomectomy with satisfactory suture of the wound in the uterus may be done without producing abortion if the patient is deeply anesthetized and kept under narcotics for several days after delivery. Even if abortion occurs, the uterus is always left for a possible future pregnancy. (4) If a uterine myoma or fibromyoma undergoes degeneration during the puerperium as evidenced by pain, fever, continuous lochia, either bright or foul, and possibly evidences of peritonitis, an exploratory operation should not long be delayed. It may be possible to enucleate the tumor through the vagina if it presents in the lower uterine segment, or if it shows evidences of spontaneous expulsion this process may be hastened by the administration of ergot at regular intervals. (5) Myomectomy may be undertaken after the birth of one or more children without fear of rupture of the scar in a subsequent pregnancy, provided infection of the scar does not take place. (6) The induction of abortion during the early months of pregnancy should not be regarded with favor, as infection or trauma may damage the tumor tissue to such a degree that convalescence may be markedly protracted and disturbed. It might be better to await the growth of the fetus to viable proportions if no complicating factors appear and then do a cesarean section with or without hysterectomy, or else do a total ablation of the uterus in the early months when symptoms demand the same.

THE PROCESSES OF TUBAL PREGNANCY*

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(From the Gynecological Pathology Laboratory of the University Hospital.)

TUBAL pregnancy is commonly understood to be pregnancy within the lumen of the tube, but is really pregnancy outside of the tubal mucosal canal and between the muscular coats of the tube wall.

When the ovum is implanted in the tube, whatever may be the cause, it is deposited upon the mucous membrane, but sinks within the tissues of the tube, so as to embed itself below the mucous membrane, exactly as it does in normal pregnancy in the uterus. The ovum penetrates the surface mucosa and buries itself between the layers of the muscle of the tube. Peters,¹ Opitz² and others have shown that this occurs in normal uterine pregnancy and that the ovum embeds itself deep within the uterine mucosa and there develops. In tubal pregnancy a similar process occurs. The ovum embeds itself below the mucosa and between the muscular coats and proceeds to develop there. The ovum has apparently a pseudomalignant property of destruction of tissue, so that it passes through the tubal mucosa by active burrowing action to rest below the mucosa. It is probable that this destructive action of the ovum is due to a proteolytic ferment as the muscle in advance of the actual destruction is altered by swelling, degeneration and breaking down of the fibres, even before the fibres are in contact with Langhans' cells, constituting the deep cellular layer of the chorionic villi. The lumen of the tube is separated from the gestation sac by a well marked muscular and mucosal layer.

The ovum is rarely embedded in a fold of mucous membrane, but must come to lie between two folds (intracolumnar) on the base of the mucous membrane which it very promptly penetrates to reside between the muscular coats. Embedding in a diverticulum of the tubal mucosa has been suggested as a cause of tubal pregnancy, but this is probably only an accident, although undoubted cases have been reported. The burrowing or pseudomalignant property of the ovum is such that it will quickly make a place for itself by penetrating the mucosa, so that such an explanation as embedding in a diverticulum is unnecessary. Embedding in a diverticulum is very difficult of proof because of this penetrating action of the ovum. Unless the scar caused by the penetration of the ovum through the mucosa is found, which would be exceedingly difficult to do, it is hard to see how embedding in a diverticulum could be proved, because the diverticulum itself may be involved in the corroding advance of the trophoblast.

*Read at a meeting of the Philadelphia Obstetrical Society, February 1, 1923.

†I am indebted to Dr. C. C. Norris, Director, for advice and assistance.

The embedding of the ovum below the tubal mucosa has been studied by Futh, Grusdew, Kuhne, Kreisch, Aschoff, Heinsins, Uleska Stroganowa, Kroemer, Fellner, v. Franque and Garkisch and others. It has apparently, however, not been appreciated that the first accident in tubal pregnancy is that of extravasation of blood between the coats of the tube wall and that the first hemorrhage is usually confined within the outer boundaries of the tube itself. The first accident is a hemorrhage at the site of the ovum and is due to the opening of blood vessels by the destructive action of the trophoblast and this hemorrhage further splits the muscular coats of the tube wall and dissects them apart. Apparently this fact has been overlooked except by Bonney and Berkeley in 1905.

A study of a number of my specimens shows that extravasation of



Fig. 1.—Early unruptured tubal pregnancy, showing intramural extravasation as the first accident. Operated upon six days after cessation of the menstruation and one day after the first colicky pains. Cross sections at the top are from the paraffin blocks and correspond to a relative position in the tube. The tube lumen with the circular or ring muscle is seen to be exempt from the hemorrhage. The hemorrhage has not yet ruptured the coats at the fimbrial.

blood within the confines of the tube and between the coats is an almost constant preliminary process in tubal pregnancy, precedes the more dangerous and extensive accidents of tubal abortion and also usually precedes that of tubal rupture. The extravasation may be continued by repeated intramuseular hemorrhages to form a hematoma of the tube where the blood is confined within the outer boundaries of the tube and does not leak on the peritoneum. In these cases, the formation of the blood clot or hematoma is often, and, in fact always at first, outside the tubal mucosal lumen itself. When the tubal lumen is entered, the perforation is by the corroding trophoblast which destroys the limiting mucosal boundary of the lumen, and not by rupture into the lumen, which is usually compressed and collapsed, as is shown in the cross

sections of the early tubal pregnancy (Fig. 1). In this case, the woman had the first symptoms of pain the day before the operation, although she passed her menstrual time by six days. The first pains were colicky and not severe. The intramural extravasation is well shown with the tubal lumen pushed to one side and the lumen everywhere intact. The hemorrhage was seen microscopically to be within the muscular coats of the tube wall and outside the mucosa. The muscular coats were apparently not only separated by the pregnancy, but also by the force of the hemorrhage which found a line of cleavage between the coats already altered by the proteolytic ferment of the ovum. The blood not only occupies the space between the distended and separated coats of muscle, but also occupies the place of muscle that has been destroyed. No blood had passed the fimbrial end of the tube.

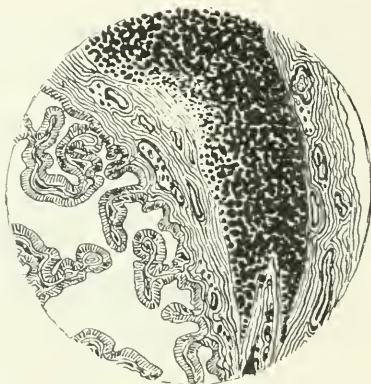


Fig. 2. Microscopic drawing from unruptured case, showing hemorrhage (black) separating the outer longitudinal coat from the inner (right) muscular coat.

The canal, itself, in early tubal pregnancy is usually compressed, as may be seen from the cross sections, which were made from the paraffin blocks. In this case, it would be difficult for this tubal pregnancy to rupture by mechanical force into the collapsed tubal lumen. The tube lumen in tubal pregnancy is not a hollow viscus to be burst into, but it is closed or compressed. In these cross sections, it may be seen that the hemorrhage goes all around the tube lumen without perforating it. When the canal is perforated, it is by destruction of the tube wall from without inwards by the corrosive action of the trophoblast. The dissection apart of the tube walls seems to be due not only to the force of the hemorrhage, but also to the preliminary weakening of the line of cleavage between the muscular coats by actual trophoblastic penetration and, in advance of this, alteration of the muscle by some process,

presumably proteolytic ferment, so that the muscle becomes swollen and glassy. The muscle fibres lose their boundaries and the nuclei disappear. The muscle is prepared for separation and the hemorrhage passes along this altered zone.

In advanced cases, the tube wall itself is destroyed, not ruptured, so that hemorrhage may result into the peritoneal cavity through the tubal ostium. It is quite common, however, that hemorrhage of the type called tubal abortion, may not be through the tubal ostium at all, but the hemorrhage may cause dissection of the tubal walls until it arrives at the fimbria where it ruptures the junction between the muscular coat and the mucous membrane to escape in a break through the tissues on to the peritoneum. Often in these cases careful dissection will show that the remnants of the tubal lumen are outside the blood clot and that the mucosa is distorted and compressed in the walls of the hematoma. This is more frequently seen in the earlier cases, as in the advanced cases the anatomic relations are much distorted.

In the advanced cases the tubal lumen is destroyed by the corrosive action of the trophoblast and lumen itself often incorporated in the walls of the sac. The true pathologic anatomy of tubal pregnancy has been long unrecognized because the hemorrhage, coming from the end of the tube, seemed to come from within the lumen and, in addition, the anatomical relations were so distorted that it is often difficult to find the vestiges of the tubal lumen. However, it may be plainly seen that tubal pregnancy grows first outside of the lumen of the canal, and, if the extension of its process, either of hemorrhage or ovular growth, gets back into the lumen, this must come by penetration of the mucosal layer from without inwards. This penetration inwards when it does occur, is from corrosive action of the trophoblast and the tube canal is merely an incident in its advance. The hemorrhage in every case is due to the action of the trophoblast which actively opens up maternal vessels by destruction of part of their walls.

The site of the ovum, outside the tube lumen in the tubal muscle, cannot be explained except as due to the corroding influence of the trophoblast upon the maternal tissue. The decidual reaction in the tube is meagre in comparison to the decidual reaction in normal uterine tissue. It takes a longer time to occur in the tube and this is accounted for by the different character of the tubal tissues. The decidual reaction with the formation of a layer of large connective tissue-like cells is not, as a rule, sufficient to form a decidual membrane. The whole picture in this specimen and in others of this study of fifteen years, is one of decidual reaction in tissue ill adapted to the purpose.

The hemorrhage in tubal abortion occurs quite frequently after succeeding intramural extravasations have formed a hematoma of the tube. In these cases, it is quite frequently found that the hemorrhage is not directly from the ampular opening, the ostium, of the tube, but

that the dissecting hemorrhage has separated the muscular coats along the length of the tube to the junction of the muscular coats with the mucous membrane at the fimbria. Here it quite frequently ruptures the junction of the mucosa and outer coats at the fimbria to pass out upon the peritoneum through this break and not through the tubal lumen of the mucosa of the canal. This mode of hemorrhage is much more common than is supposed and is overlooked on account of the distortion and destruction of tissue caused by the processes of the tubal gestation. Tubal abortion, so-called, is therefore, frequently not a descriptive term for a condition which is often neither tubal nor an abortion; but it is frequently extracanalicular, both in growth and termination, and is almost always a hemorrhage.

For this reason, the following classification of tubal pregnancy is suggested:—

1. Intramural extravasation, the usual first accident,
2. Fimbrial rupture, (tubal abortion),
3. Transperitoneal rupture, (tubal rupture).

In suggesting a new classification, it is realized that the old terms are too well entrenched in the minds of surgeons and in the literature to expect that they will be removed. However, it is hoped that this new terminology will be more descriptive of the pathologic processes involved in tubal pregnancy and will cause a more exact and searching study of their terminations. The fimbrial rupture may be through the ostium or through a break in the tissues at the ostium and outside the mucosal orifice.

In transperitoneal rupture, tubal rupture, the period of intramural extravasation is slight or missing. Those cases in which it is small are, no doubt, the severe cases of profuse intraperitoneal hemorrhage without preliminary symptoms. In a study of 1098 case reports in series, it was found that where a distinction was made as to mortality between tubal rupture and tubal abortion, the mortality after rupture was 17 per cent, while the mortality after tubal abortion was 1.6 per cent. Thus the mortality was eleven times greater after rupture than it was after abortion. In 6626 cases, all taken in series and not individual cases, the total mortality after operation upon all forms of tubal pregnancy, was 7.04 per cent. In 2909 cases, in which the location of the ovum was noted, it was said to be in the outer third or ampullary end of the tube in 75 per cent of cases, in the middle third in 15 per cent and in the uterine end infrequently. Thus, one-third of all the cases of tubal pregnancy had a mortality eleven times greater than the remaining two-thirds. This includes only cases after operation and does not include the deaths, occurring before operation, which must be due to the more fatal type of the disease, tubal rupture.

The usual course of tubal pregnancy is intramuseular embedding of

the ovum with dissection of the muscular coats of the tube and destruction of the tissue by the invading trophoblast. The first common accident is intramural extravasation of blood which precedes the first symptoms of tubal pregnancy. There follows in two-thirds of the cases, fimbrial rupture or less commonly transperitoneal rupture in one-third of the cases. Fimbrial rupture quite often occurs through dissection of the muscular coats to their junction with the mucosa at the fimbria and hemorrhage discharges at the end of the tube through a break in the tissue. In other cases, the tube lumen is destroyed by the corrosion of the invading trophoblast, so that the mucosa and its boundaries are penetrated and the hemorrhage passes through the mucosal orifice at the ostium. Tubal hematoma quite frequently forms outside the tube lumen and within the muscular coats of the tube, although the canal may be destroyed by the invading trophoblast and be incorporated into the hematoma. Intramural extravasation usually causes death of the fetus. Transperitoneal rupture may, indeed, occur as a first accident and not be preceded by intramural extravasation, or else be very closely followed by rupture in those cases of sudden symptoms and severe hemorrhage.

Intramural extravasation is the cause of the first pain in tubal pregnancy, the milder colicky pains which precede the severe pains of the passage of blood into the peritoneal cavity. Hemorrhage from the uterus occurs first at the time of intramural extravasation.

The fimbria of the tube with the distention which occurs in tubal pregnancy is very commonly retracted or engulfed within the tube on account of the stretching of the outer muscular coat and the firmness of the mucosa and the inner coat. This is one reason that the anatomic relations of tubal rupture are not commonly recognized.

BIBLIOGRAPHY

Peters: "Die Einbettung des Menschlichen Eies," Deuticke, Leipzig, 1899. *Opitz*: Zeit. f. Geb. u. Gynäk., B. iv, H. 1. *Futh*: Monatsh. f. Geburtsh u. Gynäk., 1898, viii, 590. Arch. f. Gynäk., 1901, lxi, 97. *Grusdew*: Centralbl. f. Gynäk., 1897, p. 259. *Veit*: Ztschr. f. Geburtsh u. Gynäk., 1901, xlv, 465. *Kuhne*: Beitr. z. Anat. Der Tubenschwangerschaft, Marburg, 1897. *Kreisich*: Monat. Geburtsh., u. Gynäk., 1898, ix, 794. *Aschoff*: Beitr. f. Path. Anat. 1899, xxv, 273. *Heinsius*: Ztschr., f. Geburtsh., u. Gynäk., xlv, 385. *Uleska Stroganowa*: Monatsh., f. Geburtsh., u. Gynäk., 1900, xii. *Kroemer*: Arch. f. Gynäk., 1903, 68, S. 57. *Fellner*: Arch. f. Gynäk., lxxiv, 3. v. *Franque and Garkisch*: Ztschr. f. Heilk., 1905, xxvi, No. 9.

8305 SEMINOLA AVENUE.

(For discussion, see p. 124.)

UTERINE CARCINOMA AND ITS TREATMENT BY CONTINUOUS LOW HEAT*

A PRELIMINARY REPORT

BY JAMES F. PERCY, M.D., LOS ANGELES, CALIFORNIA

CARCINOMA is more vulnerable to the application of heat than to any other known agent that has so far been employed for its destruction. The difficulty is that we have not been wise in observing Nature's method of destroying the occasional case of cancer through the instrumentality of heat. Had we done so we would have learned that a low temperature persisting for days or weeks was successfully used in the natural cure of some of these patients. But no one has ever tried, except in a very crude way, to learn how to favorably duplicate these original or natural methods for the cure of this disease. Heat in the treatment of malignancy probably started its progress with the development of the human race and of all the methods that have been urged to take its place it alone still retains its ancient and beneficent repute and character.

Rohdenburg¹ in a most illuminating and instructive article on one of the little discussed phases of the cancer question says on the subject of heat in its treatment: "It appears that the most efficacious of all the many conditions which can bring about regressive change (in cancer) is heat, applied from without or occurring under the limited conditions of long duration and comparatively low degree." Our difficulty with heat in the treatment of cancer has always been the one of not knowing how most effectively to get the maximum benefits from its employment.

There are two extremely practical factors which are commonly overlooked in our attempts to control cancer. One, heat, has just been mentioned. The other is our failure to recognize that the gross appearance of a malignant mass gives no clue as to what it will finally do to the individual possessing it. The more innocent many of these growths appear to be the greater their potential malignancy often is, while an overgrown, vicious, suppurating, painful mass may on treatment prove to be extremely benign. We have no assured means then of determining, either from the clinical or from the laboratory side even the approximate virulence of a mass of cancer. This makes it also quite certain that we have no method on which we can base an intelligent prognosis from the physical appearance

*Read before the American Association of Obstetricians, Gynecologists, and Abdominal Surgeons, Albany, New York, September 19, 20, 21, 1922.

of a given growth regardless, I repeat, of how benign or how frightful it may appear *in situ*. Many of the cases submitted to my technic have been, from our usual point of view on the prognosis of cancer, not only inoperable, but also utterly hopeless from the treatment standpoint. Yet many of these otherwise doomed cases are alive and well years after the application of the heat when it was used primarily only as a palliative. Indeed, it was at that time assumed that this was the only possible benefit that the heat application could give. Consequently we have no means of knowing, either the characteristics or the percentage of these usually fatal (if untreated) cancers, in which natural processes can, by rational management, be greatly aided to bring about an intermission, a remission or a complete postponement of the activity of the growth. We are, therefore, not justified in considering any case of accessible cancer inoperable by the heat method no matter how extensive the growth locally. The only possible exception to this is an inaccessible metastasis combined with remediless infective changes in one or more vital organs, such as the kidney or heart, and which make the outlook for the patient, if not hopeless, exceedingly grave.

Heat is a primary and fundamentally selective antagonist of the cancer cell. Radium, x-ray, d'Arsonval current and heat all have a selective action for neoplastic cells, and when they are exposed to a sufficient extent to any of these agents, are destroyed. The degree necessary for destruction of a new growth by any one of the first three, however, more nearly approaches the lethal point of healthy cells and consequently adjacent normal tissue is injured to a much greater extent than when heat alone is used. Furthermore, the penetration of heat is a rather slow process. It is disseminated by conduction rather than by radiation and is therefore absolutely controllable. This, coupled with the fact that the thermal death points of normal and malignant cells are much farther separated than is the mortality of these cells from the other three agents, makes heat the logical method of choice. Increase in temperature both local and general (acceleration of physiologic processes) is Nature's way of combating practically all pathologic invasions of poisonous substances (bacterial, proteid, etc.). Heat is involved in the reaction to disease, and it is one of the four fundamental processes of repair which have been recognized from immemorial times.² This fact alone is sufficient to explain the wide variation of the thermal death points between the normal and abnormal cells in their reaction to heat. I have also pointed out that this repair in the adjacent cells following the use of the heat in destroying a malignant tumor follows the normal type much more closely than is ever true after the use of radio-active substances or high frequency currents, and therefore in-

terferes with the normal anatomy and physiology of the part or parts in the least possible degree.

In our day the treatment of cancer has assumed new interest from the use of radium, the d'Arsonval current, and the x-ray, especially with the modern deep therapy apparatus. It is not my purpose to discuss any of these methods except incidentally. I welcome them as an excellent indication of the more rapid approach of the time when the medical profession will know what is really best and most promising in the treatment of this increasing menace to the race. That all methods in addition to heat have a place in the management of a selected minority of these patients cannot be questioned. But I also know that the greater number of sufferers will receive a larger measure of benefit from the heat treatment of their operable and inoperable growths as it can be applied today than will ever be possible from any of the so far discovered radio-active agents or high frequency currents. The mystery of radium and the secret of the unknown quantity of light which has been labeled the x-ray are no more of an enigma than is heat. It is merely another of the unexplained mysteries of our existence. Indeed, in some respects we know less about it than we know of either radium, the x-ray or the high frequency current. Heat is known as a great force in physical nature, and it is harnessed and made to perform many services to mankind. Like all the great compelling powers of creation it is invisible, except through its effects and it defies analysis. It has no weight, no dimensions, no substance. It is synonymous with sunlight, and can be produced by fire, electricity, friction or chemical action. Its destructive possibilities are legion, and not the least of these is its power for good when regulated and applied to abnormal human tissues. It will probably never be better known to man than as one of the great correlated forces. Can any of us fathom what would have been saved the members of the human family, when suffering from cancer, had it been the rule to apply a piece of hot iron to every abnormal growth while it was still a small affair? The chance that heat may, in the near future, be the solution of the question of the successful treatment of all forms of cancer is not sufficiently appreciated by surgeons.

There are two methods by which heat may be applied to cancer invaded tissues. One where it is disseminated continuously for at least an hour in cavity carcinoma; the temperature ranging from 204.5° C. to 260° C. (400° F. to 500° F.); or by the employment of a hot knife in dissecting out a localized malignant mass. These are the more familiar procedures with the cautery and are the basis for whatever recognition it has received in the past in the treatment of this variable disease.

The second method for making use of heat in the treatment of

cancer is an outgrowth of the work done on the malignant tumors of animals in the experimental laboratory. With these should be noted the cases where there has been a total disappearance of malignant growths in the human subject from diverse methods of treatment. A most interesting fact from a study of these cures is that it will be found that the method used initiated some form of irritation in the growth which seemed to cause it to slowly melt and waste away. One of these is mentioned by Rohdenburg. A woman suffering from a typical spindle-celled sarcoma of the pelvis was treated for rheumatic-like pains attributed to the growth by exposing the entire body in a continuous light bath (baking), with the hope of relieving her pain. Thirty treatments in all were given. To the surprise of everyone, instead of growing progressively worse, as she had been doing, the patient slowly improved until her health was completely restored two years after the operation. The pelvic mass also disappeared. This is not an isolated instance. To those who are especially interested I would recommend the articles by Gaylord and Clowes³ and also that by Lomer⁴ (quoted by Rohdenburg). This last investigator has collected a series of 213 cases of recession of malignant growths, occurring chiefly after the application of the cautery. These articles are intensely interesting and well worth study. But I do not want at this time to relate cases except as they may be necessary to make more clear the principle that I am trying to reveal. This is that cancer abhors heat. But we have not sufficiently appraised the immense possibilities in this great fact, at least to the extent where we have attempted to apply it practically in the treatment of the disease. I want to emphasize that I am not now discussing the comparatively brief application of high heat as applied by the cautery, but the continuous use (days and weeks) of a low temperature artificially produced in a mass of accessible carcinoma either in one of the cavities of the body or on its surface; thus applying, at will, to external malignant growths and to accessible cavity carcinoma the same methods which a continuous fever sometimes produces unbidden in the subject of cancer. The difference between this second method where the heat is applied externally and the spontaneous cures of malignancy by natural methods is that in the latter the temperature of the blood is raised by the acquired infection and this heated blood destroys the abnormal cells.

In the second method, which we are discussing, the heat is diffused from a diminutive metal thermogenic tube and acts directly on the enfeebled cells. This heating unit is the outgrowth of a cruder instrument⁵ which I had made in 1916 after learning of the experiences of Wassermann and Delbet following the subjection of laboratory animals to a continuous external low temperature—40.56° C.

(105° F.), with the result that not only did their cancerous growths not develop but they gradually receded and disappeared.

My first instrument was the outgrowth of many attempts to find a satisfactory method for applying a low temperature practically continuously in cavity carcinoma without the intervention of an anesthetic local or general (Fig. 1). With this instrument I have seen, in a few cases, a vaginal tube which was packed with cancer freed of the disease in a few weeks. I mean by this that there was no further ocular or digital evidence that a malignant mass was or ever had been in that particular anatomical location. The first temperature of the heating iron was set at 48.89° C. (120° F.). With the

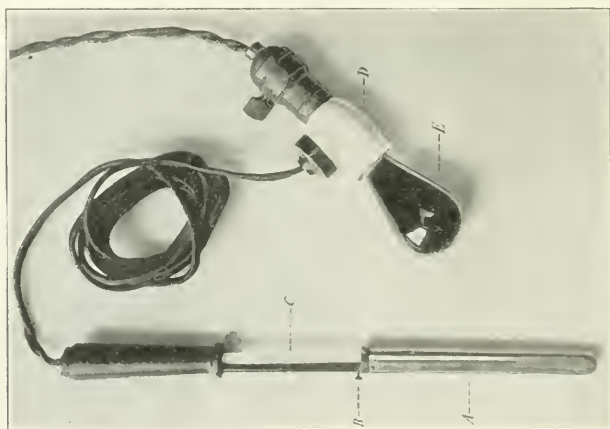


Fig. 1.—Showing a current-tap (*D*) which can be inserted in any electric lamp socket of 110 volts, on either a direct or alternating current. A carbon lamp (*E*) of half ampere with a deep blue glass globe is part of the outfit. The intense color of the globe protects the patient from the disturbance that would otherwise come from its flashing on at night, as it would when the current automatically turns away from the heating iron into the electric bulb. The degree of heat is regulated by a small set screw (*B*). The temperature while the instrument is in use is shown by the thermometer (*C*). The heat is maintained automatically in the heating iron (*A*) at the required temperature, through the series current-tap.

patient in bed this degree of heat was maintained for eighteen hours. Five degrees was added at each additional eighteen hour period until the thermometer registered 71.11° C. (160° F.). This last was continued for several weeks—in one case for six weeks. Further experience I believe will show that a temperature of 60° C. (140° F.) applied for a shorter time will accomplish all that the higher temperature and the longer period will; the explanation being that the heat in a cavity will accumulate when confined and will steadily rise even though the heating tube starts with an initial temperature

of but 60° C. (140° F.). Another important factor is the one that normal, living human tissues rapidly acquire a remarkable immunity to increasing therapeutic degrees of heat. This appears never to be true of the low grade cell. Indeed, Loeb has shown that even partial injury to a malignant cell by heat is transmitted through several subsequent cell generations.

This first instrument (Fig. 1), however, proved to be impracticable in that its mechanism was too easily put out of commission especially in hospital work. It was also larger than was necessary and consequently heavy and unwieldy. But in the few cases in which it was employed it demonstrated remarkable destructive effects on the cancer cell in the invaded tissues with a minimal degree of injury to the normal structures. I then contrived the instrument which is shown in Fig. 2. Aside from the heat controller which can be plugged

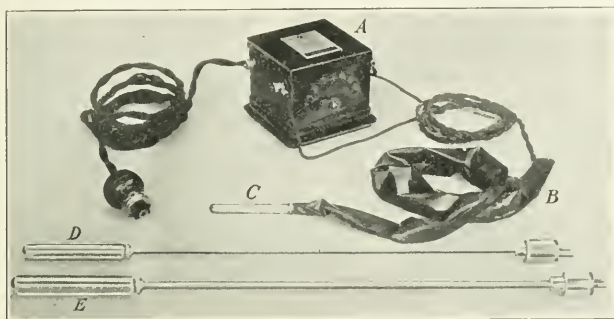


Fig. 2.—A, Transformer or heat controller; B, cigarette drain to protect lead cords from secretions; C, small thermogenic tube; D and E, medium and large thermogenic tube.

into any lighting system of 110 volts alternating current the thermogenic tube (C) is the essential part of the device. It consists of a small metal sealed tube containing a heating element activated by electricity. This latter agent in no way comes in contact with or acts upon the tissues. The effective curative agent in the tube is merely and alone simple heat.

This tube, in the treatment of cancer, can be introduced into a cavity containing the disease or into a malignant mass in the same way as radium is now employed. The tube of heat, however, will have the advantage of avoiding the present destructive effects on normal structures peculiar to or characteristic of the uncontrolled penetration of radium and of the x-ray. In carcinoma either in mass or in a cavity this heater can be so regulated as to supply a degree of low heat sufficient only to penetrate the involved tissues the neces-

sary distance. As will readily be understood this at once removes an objection to the cautery where the high heat of that instrument was, to many surgeons, a barrier to its most effective use. It will also tend to turn the minds of physicians in general away from the unfortunate and erroneous idea that the cautery is in some way the essential element in the success of this method in curing cancer. The mere use of the word cautery has caused many surgeons to overlook the fact that the effects produced in cancer are derived from and are dependent upon the thoroughness of the diffusion of the element heat from the heating iron uninfluenced by an extraneous agent. I trust, however, that I shall not be misunderstood. This therapeutic thermic applicator is not offered with the idea that it will supersede the use of the knife cautery. It can never entirely do that. In patients suffering from an external malignant growth, especially if it is suppurating, the hot knife will still be found to be the most satisfactory method yet offered for its safe removal.

The purpose of this paper then is to make a preliminary report on the value of the prolonged use of a low degree of heat in the treatment of cancer in the class of cases in which it can be made applicable. One of these is the vagina, cervix, utero-cervical junction and body of the uterus. In the majority of instances where this simple apparatus is used the heat is easily regulated and controlled so as to be destructive only in a minimum degree to normal tissues acting in the greatest measure as a destroyer of the cells of cancer in any portion of the birth tract. An additional benefit is the one of practical freedom from danger and as well simplicity and comparative cheapness of the required apparatus.

There is only one caution that I want to emphasize in the use of this heater. Don't shove it into a mass of cancer. Force or roughness or any kind of movement or manipulation has no place in the treatment of this disease. If it cannot be deposited in a mass or cancer filled cavity without the slightest traumatism, the cautery knife should be used to make a pocket into which it can be easily introduced.

REFERENCES

- (1) *Rohdenburg, G. L.*: Jour. Cancer Research, 1918, iii, 193-225. (2) *Ruech, G. A.*: Medical Record, November 12, 1912, lxxxii, No. 19, p. 845. (3) *Gayford and Clowes*: Surg., Gynec. and Obst., June, 1906, ii, No. 6, pp. 633-650. (4) *Lomer*: Ztschr. f. Geburtsh. u. Gynäk., Stuttgart, 1903, i, p. 305. (5) *Am. Jour. Obstetrics and Diseases of Women and Children*, lxxv, No. 1, 1917. Practically this same article also appeared in *The Canadian Practitioner and Review*, February, 1917.

HEMORRHAGES IN THE NEWBORN*

BY LUCIUS A. WING, M.D., NEW YORK CITY

WITHIN the past decade, the closer study and observation of the newborn infant revealed a greater incidence of abnormal conditions than was formerly recorded. Aside from anomalies of development, these conditions are chiefly traumatic in origin, and their subsequent course is dependent upon the degree and character of the injury, upon the vitality and adaptability of the individual infant, and upon early recognition and treatment in certain cases.

Of conditions affecting the newborn intracranial lesions associated with hemorrhage are of great importance, not only because of their frequency and high mortality, but on account of the permanent damage which results in many of the survivors.

Kearney, in a recent report of the examination in New York of 480 children with cerebral spastic paralysis, with or without mental deficiency, states that intracranial hemorrhage at birth is responsible, pathologically, for 70 per cent of the spastic type of paralysis in children, and for 20 per cent of the idiocy and feeble-mindedness now existing.

He observes that, with a knowledge of these statistics, it is a prime consideration in present day obstetrics that every means be employed to minimize the chance of injury to the infant's cranium and its contents.

As has been ably pointed out by Ehrenfest, the frequency of fatal intracranial lesions is far greater than even recent infant mortality records would indicate. Many infant deaths, ascribed to asphyxia, are in reality due to intracranial or other injuries, the exact character of which can only be determined by a properly performed autopsy. It should be emphasized that fatal intracranial hemorrhage may occur in an infant born spontaneously, in what is considered a normal labor.

According to time of onset, hemorrhages in the newborn may be divided into two main groups: first, those occurring during or immediately after birth; and secondly, those occurring or manifesting symptoms after a period of some hours or days.

1. We may first consider the cases of intracranial trauma with gross hemorrhage.

Various observers report more or less extensive subdural intra-

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cranial hemorrhage in from one-third to one-half of the autopsies upon stillborn infants, and in those dying in the first few days of life. In addition to hemorrhage, other traumatic effects are frequently present in cases of this type.

In 59 fatal cases of intracranial hemorrhage, 20 of which were breech and 39 vertex cases, Browne observed tearing of the tentorium cerebelli in 37 per cent, 63 per cent of which were in breech deliveries.

Losee has tabulated the location and extent of the hemorrhage found at autopsy at the New York Lying-In, in a recent series of 69 cases of intracranial hemorrhage, as follows:

Over both hemispheres,	10 cases
Over one hemisphere, and beneath the tentorium,	12 cases
Bilateral and beneath the tentorium,	16 cases
Bilateral, beneath the tentorium, and in the ventricles,	23 cases
Beneath the tentorium and in the ventricles,	7 cases
Epidural	1 case

The same observer, in autopsies over a period of ten years at the Lying-In Hospital, has observed fatal intracranial hemorrhage twice as frequently in breech extractions as in forceps operations.

Intracranial hemorrhage, occurring during and immediately after birth, may be due to the direct tearing of blood vessels in various regions, or to the rupture of thin-walled vessels by increased pressure from within.

Death, if it ensues, is due to compression of the medulla through general increase in intracranial pressure, or to more localized pressure, if the hemorrhage is beneath the tentorium.

Nature has admirably protected the infant's delicate cranial contents from the traumatic effects of the forces of labor, provided the normal vertex mechanism prevails, and there is no disproportion.

With proper engagement and progress of the head, the forcible contractions and thrust of the uterus are balanced, so far as the infant's head is concerned, by the firm support of the birth passages.

By virtue of this support of the maternal tissues, increased intracranial pressure and disruptive intracranial effects are minimized, as the cranial contents are largely fluid and noncompressible.

It follows, as a matter of mechanics, supported by clinical observation, that more intracranial injury may result in a few moments during a hasty or unskillful forceps operation, or similar attempt to extract an aftercoming head, than may result from some hours of strenuous labor with normal vertex engagement.

The hemorrhage following difficulty in the extraction of the aftercoming head is usually in a dangerous location, being most frequently found beneath the tentorium, or in the region of the medulla, and often associated with tears of the tentorium.

Babies with subtentorial hemorrhage are frequently stillborn. If respiration can be established, the infant may survive, but death in from a few hours to several days is most often observed. The clinical appearance of these infants is most typical; they are limp, have a squeaky, high-pitched cry, the respiration is irregular, and they often show alternating periods of pallor and cyanosis.

Intracranial hemorrhage following vertex cases is more often observed over the cortex, due to rupture of the cortical veins; the prognosis in these cases is usually better. In the more severe types, however, the hemorrhage is often bilateral, within the ventricles, and more or less diffuse within the cranial cavity, and the course is similar to the preceding subtentorial type, through compression of the medulla.

It is not within the scope of this paper to discuss in detail the diagnosis, prognosis or treatment of these severe types of intracranial trauma. In general it may be stated that in the more extensive lesions, the infant is either stillborn or dies shortly after birth.

Intracranial lesions of greater or lesser degree, may be suspected in all babies showing asphyxia at birth, in whom resuscitation is difficult, or when prolonged efforts are necessary to establish respiration, and particularly when the latter shows irregularities after establishment.

It may be emphasized at this point, that only the gentlest manipulations are permissible in attempting to establish respiration.

The prognosis, both as to life and future health, in babies with intracranial trauma, depends on the anatomic location and the extent of the ensuing hemorrhage.

The treatment of these infants may be considered in the prophylactic sense, by avoidance where possible of sudden or severe pressure on the child's head through any agency or procedure.

Surgical treatment by decompression, relief of intracranial hypertension by lumbar puncture, and the administration of blood or serum where hemorrhagic tendency exists, are modes of treatment applicable to suitable cases.

2. Asphyxia, without gross intracranial hemorrhage, is recorded by various observers, in about one-half of the stillborn. In this group of infants, Losee and others have observed quite constantly the presence of capillary hemorrhages in various localities, chiefly over the cerebral cortex, the epicardium, the capsule of the liver, the pleura, the retina and beneath the conjunctiva. Many babies survive and do well, who have shown at birth marked asphyxiation with delayed establishment of respiration, and it may be presumed that capillary hemorrhages occur in many of the survivors.

Should these infants develop an early blood instability, it is probable that fresh bleeding occurs in some areas where capillary hemorrhage has previously taken place.

Although it has not been demonstrated that asphyxia alone has a marked influence on the development of hemorrhagic tendency, yet it would seem wise to regard infants in this group as potential bleeders, and to keep them under very close observation. Frequent observations on bleeding and clotting time should be made upon infants of this type during the first week after birth.

Recently we have determined the bleeding and clotting time by the Rodda method in a series of twenty-five infants, delivered by some operative procedure after abnormal labors in which were observed disturbed fetal heart action, the passage of meconium, or other evidences of fetal distress. No infants were included in this series which showed definite intracranial injury at birth, but all showed a greater or lesser degree of asphyxia, with some delay in establishing respiration.

Bleeding and clotting time determinations were made by the Rodda method on each of the twenty-five infants on the first, third, fifth, seventh, and ninth days postpartum. At some period during the examination the coagulation time was found delayed in seven cases, it was found normal at each examination in the remaining eighteen cases. The bleeding time was found normal at each examination in twenty-four cases. In one case the bleeding time was found prolonged on the third day, but became normal again on the fifth day, and this infant presented no clinical symptoms of hemorrhagic disease at any time. All the infants in this series were discharged from the hospital in good condition. It may be noted that seven of the twenty-five infants showed a transient delay in coagulation time, a higher ratio than is usually observed in normal infants.

3. Hemorrhages developing in the newborn some hours or days after birth, are usually associated with hemorrhagic diathesis.

Autopsies upon cases of this type, in which death was due to intracranial hemorrhage, will usually show hemorrhage in other parts of the body, particularly in the lungs and in various abdominal organs, especially the suprarenals.

Rodda and others have shown that the normal newborn infant, exhibits a progressive lengthening of bleeding and clotting time during the first few days after birth, reaching its maximum on the fourth to the sixth day, and returning to normal from the eighth to the tenth day postpartum.

The normal clotting mechanism of the blood is a somewhat complex phenomenon, and the etiology and pathology of hemorrhagic disease of the newborn are not definitely understood. It is a well-established

clinical observation, however, that a certain number of newborn infants fail during the first few days of life to maintain a proper stability of the blood. I believe that we have evidence that parturitional trauma and exhaustion have a decided bearing upon this loss of blood stability. Losee and the writer have observed a number of these infants at the Lying-In Hospital, and have been impressed with the abruptness with which symptoms may develop in an infant whose previous condition had seemed quite good. A certain number of infants in this group are born following normal labor, a certain number are premature, but the majority, in our observations, have been babies born after long hard labors, or operative deliveries. We have come to regard all such infants as potential bleeders and to observe them very closely for the sudden development of intracranial hemorrhage. Symptoms most often develop in the third, fourth or fifth day post-partum, and in the first few hours are not always clearly indicative of an intracranial lesion.

Among the earlier symptoms observed are loss of eagerness or of ability to nurse, listlessness and pallor. A little later the cry becomes higher pitched, the infant shows some spasticity and often slight retraction of the neck. The anterior fontanelle usually shows increased tension. Nystagmus is often seen and also changes in the fundus.

Later, convulsions and respiratory symptoms develop if the hemorrhagic area increases, and death ensues through paralysis of respiration.

Delayed bleeding and clotting time will be observed in these infants, usually from the onset of clinical symptoms. In some of the infants, however, bleeding and clotting time changes did not appear until after definite clinical symptoms were present to a marked degree.

Early recognition and treatment before the more serious symptoms develop is very important in these cases, and treatment should not be delayed in cases where blood changes are indefinite by laboratory test. At the Lying-In Hospital, the subcutaneous injection of human serum, as a therapeutic measure, has proved very effective, if given early. The usual dosage is 100 c.c. in the first twenty-four hours, divided into three or four doses, injected subcutaneously in the dorsal region at intervals of four to six hours. During the second twenty-four hours, fifty to sixty c.c. of serum are given in the same way, if it seems advisable.

Whole blood may be used instead of serum with equally good result, but whole blood is not absorbed as rapidly as serum and is more prone to cause irritation at the site of injection. Outside of hospitals, the administration of whole blood is preferable, on account of simplicity of technique.

The improvement in general condition and the abatement of cerebral symptoms following the administration of serum is often very rapid and satisfactory, if the serum is given early. No typing is necessary for the subcutaneous administration of blood or serum, and we have observed no unfavorable reactions following their use.

4. A certain number of newborn infants develop hemorrhagic disease of the type which has been recognized clinically for a considerable period. These cases are characterized by the development within the first few days after birth of hemorrhages beneath the skin, bleeding from the mucous membranes, the cord and elsewhere. Intracranial bleeding may or may not occur, and these cases if untreated, die from the general loss of blood, rather than an intracranial lesion. Birth trauma and prematurity appear to have an influence upon the development of this condition. These infants show marked lengthening of the bleeding time and delayed clotting time of the blood.

In a series of 21 cases of hemorrhagic disease of the newborn observed at the Lying-In Hospital by Losee and the writer, 11 cases were operative deliveries, as follows: Six forceps applications, one breech extraction with dry labor in an elderly primipara, and four internal podalic versions and breech extractions, three for pelvic deformities and one for prolapsed cord. In several of the remaining ten cases, the mothers had long hard labors, but were delivered spontaneously. These twenty-one cases were all of the typical well pronounced type of the disease, and were treated by blood transfusion or the subcutaneous injection of human serum. One baby in the series died of cerebral hemorrhage and anemia, the others completely recovered. Twelve of these babies have been followed for a year or longer, these have developed normally and have shown no recurrence of bleeding tendency. Transfusion, with either unmodified or citrated blood, controls the bleeding tendency more rapidly than the subcutaneous injection of whole blood or serum, and restores the blood already lost by the infant but necessitates some delay for typing and preparation.

In concluding these observations on the subject of hemorrhages in the newborn, the following points may be emphasized.

1. Hemorrhages developing in the infant during birth or shortly after, are of greater frequency than was formerly believed; they often occur in babies born spontaneously.

2. Sudden or severe compression of the child's head, either by the natural forces of labor or by some obstetrical procedure, is the chief mechanical cause of intracranial lesions.

Asphyxia of the infant during birth has an influence on the stability of the blood and impairs the clotting power. This renders these in-

fants especially susceptible to both immediate and delayed hemorrhagic lesions.

3. Therapeutic measures, to be effective in these cases, should be employed early in their development; the attending obstetrician should thoroughly appreciate his responsibility for the early recognition of hemorrhagic conditions in the newborn.

REFERENCES

- (1) *Hurwitz*: Am. Jour. Med. Sc., 1917, 689. (2) *Warwick*: Am. Jour. Med. Sc., 1919, 95. (3) *Rodda*: Jour. Am. Med. Assn., August 14, 1920. (4) *Browne*: British Med. Jour., 1921, No. 3161, p. 140. (5) *Ehrenfest*: AMERICAN JOURNAL OF OBSTETRICS AND GYNECOLOGY, iv, No. 1, p. 61. (6) *Ehrenfest*: Birth Injuries of the Child, D. Appleton & Co., 1922. (7) *Losee*: Bulletin Lying-in Hospital, July, 1922, xii, No. 2. (8) *Kearney*: New York State Journal of Medicine, August, 1922, xxii, No. 8.

Society Transactions

TRANSACTIONS OF THE AMERICAN ASSOCIATION OF OBSTETRICIANS, GYNECOLOGISTS AND ABDOMINAL SURGEONS

THIRTY-FIFTH ANNUAL MEETING

ALBANY, NEW YORK, SEPTEMBER 19-21, 1922

(Continued from June issue)

DR. JAMES F. PERCY, LOS ANGELES, CAL., presented a paper entitled
Uterine Carcinoma and Its Treatment by Continuous Low Heat.
(For original article see page 78.)

DISCUSSION

DR. AARON B. MILLER, SYRACUSE, NEW YORK.—Several years ago, I attended one of the western meetings, when Dr. Percy demonstrated his method of operating with the cautery. I was much impressed with his enthusiasm, but I left the meeting and came home with the feeling that I did not care to be treated in that way, nor so to treat my friends. One of our Rochester associates was so enthusiastic that he brought home the apparatus, and I said to him, "According to the theory which Dr. Percy has presented and the demonstration which we have witnessed, I shall send to you all the bad cases of cancer, because I do not want to have the people in Central New York following me around, with discharges of the rectum and bladder coming through the vagina. Dr. Percy has made an impression with what he has shown us today, for I believe it has much merit, and that his improved mechanical device is a marked advance in our armamentarium in treating malignancy of the womb."

"One swallow does not make a summer," but there was an instance where I was thoroughly impressed, and am at the present time, that heat *did* bring about the recovery of a case of cancer. Near our city, a woman with advanced cancer of the cervix was cared for by an able surgeon, and feeling it was an inoperable case, the only thing that could be done would be to afford her relief. He burned out the tissue of the cervix and into the fundus with the actual cautery.

Several months after this, I was asked to see the patient at her home. My opinion was that she could not live long (and I had all confidence in the diagnostic and surgical ability of her physician) which opinion was confirmed by my examination. I found her pelvis filled with an exudate, and concluded this was an extension of the malignancy. It conformed to the condition we recognized forty years ago as pelvic cellulitis, a good enough name at that time, as we did not know better. So I told her people there was no question but that the prognosis was very bad. She was not sufficiently ill to be confined to her bed and kept there, and it was thought better to get her out in the air, bring her to the city and have her treated by a radium specialist.

Accordingly, she was brought to the city and received radium.

I did not hear anything from her for a long time, but two years ago, on returning from the meeting of this Association, I found her at my office with the physician who had called me to see her in consultation. I was a little amazed. I wondered how she could have been brought back from the grave.

Physical examination revealed the pelvis absolutely free from any disease, only the absence of the cervix, the exudate had passed away, and she seemed to be in a normal condition.

The radiologist takes the credit of having cured her. There is no question in my mind but what it was the cautery action which brought about this cure.

DR. G. VAN AMBER BROWN, DETROIT, MICHIGAN.—Five years ago next December I first began to follow Dr. Percy in his treatment of carcinoma of the cervix by heat. Since then I have operated upon 14 patients, combining with the use of heat, ligation of the internal iliacs and ovarians, in some cases dissecting out the postperitoneal lymphatic glands. Of those 14 cases, two died immediately following operation. One of these was moribund when she went to the operating room. In another, cancer was complicated with fibroids and pyosalpinx. She died from a peritonitis eight days after operation. Of the other 12 cases, there are four that have shown a recurrence; two died early; the third one I operated on five years ago next January and she died the first day of June this year, but whether of carcinomatosis or not, I have not learned. The fourth is still living with a recurrence, of very slow growth. So that of the 14 cases eight are today, symptomatically at least, perfectly well.

You may remember the case of a young woman, 27 years of age, which I reported last year, an advanced case in which we used heat with ligation. She refused to have anything further done. That woman menstruates three days in the month, and only two days before I came here her husband reported that she was enjoying the best of health. I have not examined her for ninety days.

In connection with this work, I desire to call your attention to the behavior of cancer cells which are within the walls of the three coated blood vessels. These cells are less vulnerable to the effects of heat than those not so situated. It occurred to me that the reason for this is—that just as the water circulating in the water jacket of an automobile has a cooling effect on adjoining structures, so the blood circulating in these larger blood vessels has a cooling effect on their walls, thus preventing, when heat therapy is employed, the destructive effect on the cancer cells growing within these walls. So if in the treatment of carcinoma of the cervix the use of the starvation ligature is resorted to, thus checking the blood stream, these cells within the walls of the larger blood vessels will be rendered as vulnerable to heat as are cancer cells outside blood vessel walls.

I would like to ask Dr. Percy a question. He spoke of applying the cautery to masses of macerated tissue by forcing the instrument into the mass. If we so employ the cautery, is not a carbon core produced, and if so, it would prevent the dissemination of heat, also act as a plug, thus checking drainage; and if the carbon core is not produced how do you prevent it—or how should the condition be met if the core is produced?

DR. GORDON K. DICKINSON, JERSEY CITY, N. J.—If we do not happen to have the Percy material and instruments, we can use the method of the late Dr. Byrne, of Brooklyn. For a number of years I have been employing that.

There is one case I want to speak of, a woman with an epitheliomatous cervix of some size. In ten days the uterus was removed, and cancer cells could not be found.

DR. JAMES E. DAVIS, DETROIT, MICH.—The remarks of Dr. Percy recall the classical experiment of the two frogs, when the foot of one frog was placed in the

stomach of another frog. So long as the foot in the stomach of the other frog was alive, that foot was not digested, but digestion commenced immediately when the leg was amputated. The same technical biological law holds as far as this subject is concerned.

In regard to the behavior of tissues after treatment by heat, I have been very much interested in studying some of the sections given to me for diagnosis. I have had the tissues before any work was done, also after one treatment with heat, and then again after several treatments. It is exceedingly interesting to note the changes that take place in these tissues. A living tissue cell must have a circulatory system. In the higher types of life, we have a circulation that is to a large extent within thin walls. Some of the walls have doubly coated vessels, and some are single coated vessels. We have tissue spaces in which there is lymph fluid or tissue fluid; the subjection of the tissue to a temperature that is above what may be called its ultra toleration will bring about interesting intracellular rearrangement. The cell undergoes demobilization, the outline of the cell as perceived under normal conditions is lost; it becomes blurred. Just whether that cell can mobilize or not, is a question. We do know, when we get a mass of cells all demobilized, and there are no intracellular spaces, then it is impossible to have mobilization of tissues. In other words, the tissues are to be considered devitalized. After dealing with the cells we necessarily look to the condition of the tissues, the arrangement of the cells one to another, the different types of cells, etc.

In cancer one of the most important changes that we have to bear in mind is that which we see, for instance, in epithelial tissue in the germinative layer of cells. When this is disturbed, and the growth is below this layer, we have one of the reliable proofs of malignancy. In the application of heat we find the germinative layer is particularly affected; in other words, the normal behavior of this tissue is directly interfered with.

I think Dr. Brown has an excellent idea of going one step farther and depriving these tissues of the blood supply where that is possible. I have examined a number of sections from tissue he has sent to me, and it does seem that by this combined method you do get a very rapid and pronounced result. It practically duplicates the condition that you see in tissues where the natural resistance is being built up against malignancy. There is embolism of the blood vessels, increase of the connective tissue and later on there is scar tissue formation with segregation of the area that is involved in the malignancy. When the blood vessels are tied off and the tissues subjected to heat, it does seem as if you had brought about the conditions that are ideal for arresting the cancer mass. The result is determined by the accessibility of the heat, or the ability to cut off the circulation beyond the area so as to completely isolate it. Accessibility of the cancer tissue seems to be the real difficulty to overcome.

DR. FREDERICK S. WETHERELL, SYRACUSE, N. Y.—Dr. Percy has presented no statistics of any kind, this being strictly a preliminary report. We see cases of inoperable or so-called inoperable carcinoma of the cervix, and repeatedly they die, notwithstanding radium or x rays. This paper will be widely read, and we would like to have an answer for the men who are discussing this paper *pro* and *con*, what Dr. Percy's experience is in these inoperable cases of carcinoma which go on in spite of the fact that they have had radium and x ray treatment and ultimately die.

DR. RUFUS B. HALL, CINCINNATI, O.—I would like to ask Dr. Percy whether if a woman during her first labor had an epithelioma in the cervix, as large as a big orange, filling the whole vagina, he would destroy that by the curette or cautery knife before he would use continuous heat.

DR. PERCY, (closing).—I am quite sure that you will hear a great deal more about this low heat method of treating accessible cancer in the near future, for the reason that it has much in it of permanent value in this disease. All it requires is that surgeons learn the methods and indications for its use. The heat treatment, as it has been developed in recent years, follows the lines of recognized surgical procedures. In addition, one is not working in the dark with an uncontrollable agent, but rather with one with which we can always determine the correct limits of its application. It is also infinitely less dangerous to normal structures and to the general well being of the patient than is true today of radium or the more recent deep therapy x-ray apparatus.

In answer to Dr. Brown's question as to the procedure best suited to the destruction of the cancer cells that have already invaded the walls of the blood vessels. It is a most interesting fact that the vessel walls, and also nerve structures tolerate at least a third more heat without permanent injury than other tissues of the body. You can apply the heat to the blood vessels, especially the arteries, sufficient to brown them, and even leave seared areas such as appear on your toast in the morning from contact with the hot wires of your electric toaster. I have done this many times and I have never seen any immediate or subsequent harm come to the vessels so treated, and the cancer cells in their walls are certain to be destroyed. In some of my early papers I explained this resistance as due to the uniform temperature of the blood which they contained protecting their walls from overheating. I thought this observation original with me, but I found later that Doyen of Paris had made and published the same observation. I have been through a lot of grief in order to obtain the facts as I now know them regarding the action of heat on human tissues, but someone had to get this information correctly. The surgeons who take up this work from now on will have a much easier time. I have taken a mass of cancer that surrounded the whole extent of the axillary vessels and fully two inches in diameter and cleaned that mass from the vessel walls so that no vestige of the disease remained. If the malignant cells have involved some portion of the depth of the walls these will entirely heal over in the general repair that follows the application of the cautery heat. It is well to start the dissection of the pathological structures by beginning in the normal tissues just adjacent to it. This will give one the correct anatomical landmarks that can be followed into the growth with the hot knife. The flat blade of the knife cautery can often be shoved along the blood vessel if it is done quickly, and then brought rather suddenly out through the overlying exuberant mass. This will split the accumulation of cells that surround the vessel, and if you are not too awfully slow in this maneuver you cannot possibly do any injury to the vessel walls. When the mass is split it is a comparatively simple procedure to push the remainder of it entirely away from the rest of the structures to which it may be adherent, with the nose of the cautery knife. It is most impressive how resistant these blood vessels are for a very short time to the application of a cautery knife that frequently has a temperature of from 600° F.—800° F. The stumps of the small arterial branches that are necessarily severed in this way are tied with No. 1 plain catgut. The fundamental thing is that cancer cannot be successfully transplanted after it has been heated for ten minutes to 113° F., (45°C.) Cancer really seems to abhor heat.

As to my statistics:

I am frequently asked about these. Frankly, I have never been greatly interested in my results merely as results. My chief concern has been to know whether I could destroy an otherwise inoperable mass of cancer so that the patient would live free from the further plague of her disease. So far I have been able to do this in 17 per cent of my uterine cancer cases. Please remember that these were

of the utterly inoperable type. They belonged to the class that we have heretofore absolutely refused to do more than try to palliate with morphine. Even if you clean up these malignant growths with the cautery the patient frequently dies because of a coincident myocarditis, or if not this, a surgical kidney which has resulted from the previous sepsis incident to the breaking down of the tumor.

When we are considering statistics in operations for cancer situated at the utero-cervical junction we should not forget those of John Byrne. He reported over 60 per cent of his cases alive and well beyond the 5 year period, and no one has ever called in question the correctness of his statistics. Byrne for years thought it was the electricity in his cautery blade that was responsible for his good results, but I found in the last article that he published where he used the word heat for the first time. Dr. Byrne never opened the abdomen to learn the direction of the uterus in the pelvis, but determined this by the introduction of a sound into the cervical canal and up into the body of the uterus. Then with his long handled cautery knife he coned out the entire cervix through the utero-cervical junction. His excision often extended through the utero-cervical junction into the body of the uterus. When he had completed his operation the vault of the vagina looked not unlike the dome of a cathedral. It was after such an excision that he applied his mushroom shaped cautery tip until he had thoroughly dried out the remaining tissues. I believe that this initial work of John Byrne will finally prove to have been of transcendent importance in the final solution of the treatment of cancer by heat.

I do not want to be understood as decriing the use of either radium, the x-ray or the d'Arsenval current (Diathermy). They still have a place in the treatment of a selected number of these cases. I have had a great deal of personal experience with the last two, and have seen the practical results from the use of radium under the direction of those who were qualified to use it. It is not necessary to detail my experiences with any of these methods or agents except to say that they require expert knowledge of the highest type especially along the lines of the natural sciences. This is something that the majority of those who are now trying to make use of them do not possess, and it will remain a handicap to their most successful use for many years to come. The ease with which all of these agents set up and leave a chronic endarteritis after their application is most discouraging to their more efficient use. The case cited by Dr. Miller is interesting. But that same thing happens time and again.

Ewing of New York said to me a few years ago, that the balance in cancer is easily upset, and it is. But the devilish side to it is the ease with which it is disseminated. Doyen likens it to a shower of pollen distributed by the wind. I always think of cancer reinfection as being as subtle and as mysterious in its possibility for reappearing, after we have tried to destroy it by the usual methods, as is the arrival and spread of the bacillus pyocyaneus in our surgical wards. Cancer sometimes comes almost like an apparition, apparently from nowhere, except where we use the heat and then it does not return in that particular region. Heat effectively heads it off.

There are a lot of patients who are alive and well over the country who have been operated on as Dr. Brown reports. No one so far has brought the number of them to the attention of surgeons. Dr. Rea Smith of Los Angeles had six patients with utterly inoperable uterine carcinoma yet they are perfectly well over the five year period. This, I may say, is not an isolated instance. These were his first cases following my technique, and this report, I report, can be duplicated in many other places not only in this country but abroad.

We are prone to manipulate a mass of cancer too much, too often and too roughly. Some of us are almost as bad in this regard as are the so-called "rub

doctors." I am convinced that we loosen fragments of the tumor and set them free in the circulation to take on new virulence in a new location by our thoughtless and indelicate handling of these tumors. Cancer should be treated as far as touching it is concerned, as if it were a most valuable piece of Dresden china.

Regarding the question of Dr. Hall as to the treatment of the large masses of cancer in the cervix, and whether I would clean them up first with the cautery before applying the continuous low heat as I have outlined it in my paper. If giving a general anesthetic, in order to destroy the mass with the cautery does not interfere too much with the natural resistance of the patient to cancer, then undoubtedly its destruction would leave less for the continuous low heat method to do. To destroy as much of the gross mass as is possible at one sitting and then to apply the continuous low heat is, in the largest number of cases, the wisest course to pursue.

I have seen a vagina that was packed full of cancer clear up in a few weeks from the application of the continuous low heat so that there was absolutely no clinical evidence of the disease remaining.

I have received considerable criticism because occasionally my technic is responsible for a vesicovaginal fistula. But if there is cancer near or into the bladder it should be destroyed, fistula or no fistula. What is the use of operating if we are to leave a bladder infected with cancer untreated? It is well to open the bladder suprapubically and apply the heat direct. In this way one can do much more efficient work through the direct application of the heat.

The results in bladder cancer are most gratifying. My first case is alive and well after eleven years. A most important point when the cautery is used to apply the heat is to hold the instrument still or quietly in one place until all of the tissues are fixed by either the cancer, or by an inflammatory exudate are rendered normally movable again. Unless you do that you have not gotten penetration sufficient to destroy your malignant infection. You cannot wobble your heating iron all around as some surgeons do when attempting to get the maximum benefits from the heat treatment. Heat penetration cannot be most effectively secured in that way. It takes time to apply the heat effectively, but it makes the difference between success and failure.

DR. YATES.—How often and how long do you apply the heat to these fixed tissues?

DR. PERCY.—If you make your tissues freely movable from the heat at the first sitting that is usually all that is necessary in the way of treatment. The time required to get this result in the average case is usually about an hour, sometimes less and sometimes over. The time that the patient is on the table does not seem to matter if they are given the minimum quantity of ether which is usually all that is ever required.

DR. LUCIUS A. WING, NEW YORK CITY, read a paper entitled **Hemorrhages in the Newborn.** (For original article, see page 85.)

(Concluded)

NEW YORK OBSTETRICAL SOCIETY

MEETING OF JANUARY 9, 1923

THE PRESIDENT, DR. R. H. POMEROY, IN THE CHAIR

(Program contributed by the Junior Staff of the Woman's Hospital)

DR. GEORGE F. HOCH presented a résumé of **The Incidence and Treatment of Syphilis in the Service of the Woman's Hospital.**

Several years ago it became a routine to do a Wassermann test on all admissions to the Hospital. The number showing some serological change was great enough to warrant the inauguration of a clinic for their treatment one and a half years ago.

The hospital having no limited district many patients are received from outside New York City where there are no facilities for their treatment. It seemed therefore all the more urgent that the hospital have a clinic for their care.

The diagnosis with very few exceptions was made on the blood changes. Every patient was subjected to an historical and clinical examination. Only after the proper evaluation of all evidence was the sum total allowed to influence us in making a diagnosis of syphilis.

All tests showing anything but a complete absence of hemolysis were set aside for further study and only on clinical or historical evidence did we make a diagnosis of syphilis.

With the complete absence of hemolysis however we felt safe in assuming that the patient had syphilis, regardless of any other evidence.

The tests were all done with two antigens, alcoholic extract of beef heart and a cholesterinized antigen.

When then are we warranted in making a diagnosis on a positive Wassermann reaction?

The All-American Conference on Venereal Diseases considered all frank Wassermann reactions as positive with the following exceptions:

(1) Absence of luetic history with positive Wassermann diagnosis made with care and another Wassermann done.

(2) Weak reactions cannot be accepted and call for further study.

(3) Negative Wassermann cannot be regarded as proof of absence of lues.

(4) Cholesterinized antigen being very sensitive, is of particular value as therapeutic index.

(5) Negative reaction is no indication for stopping treatment.

Together with these exceptions may be added yaws, which is never present in this climate and can be disregarded, leprosy, some cases of relapsing fever, and febrile stage of malaria. With moderate caution all these pitfalls can easily be avoided.

Many of our patients gave histories of frequent abortions which we considered of clinical importance. Williams has shown that one out of every five abortions is due to syphilis. As the evidences of the disease, in women, are often masked, especially in colored women, who have no distinct recollection of rash or mucous patches it seemed that we were warranted in starting treatment with no more evidence than a complete absence of hemolysis in our serum.

During one and a half years there have been 3130 admissions to the Hospital and patients in the Out-Patient Department on whom Wassermann tests were done independent of the Obstetrical Service. Of this number there were 158 cases of lues in the wards and 117 in the Out-Patient Department, 8.7 per cent.

On the Obstetrical Service there were 495 admissions with eight positive Wassermans after four to six weeks. It is our routine always to check these.

This discrepancy is readily appreciated when we note that 75 per cent of the positive reactions in the ward admissions were on colored patients, who are potentially classified as "those who are and those who will be syphilitic". There are no colored patients admitted to the Obstetrical Service.

Practically all of the four per cent who showed active lesions were from the Dispensary. Four primary lesions were seen, two on the cervix and two on the labia.

We had four living children with positive cord Wassermann reactions, only two of which have returned to the clinic for treatment or observation. We do not make a diagnosis of congenital lues on a cord Wassermann in the absence of clinical findings. Many positive cord Wassermans have negative blood Wassermans after four to six weeks. It is our routine always to check these.

If however there is any evidence of the disease such as eruption, enlarged spleen or liver, which occurs in 55 per cent of congenital luetics, or rhinitis which occurs in 48 per cent, according to White and Veeder, treatment is instituted immediately.

We have tried to standardize the treatment so it simplifies the handling of the cases. Neoarsphenamine and mercursol are used at weekly intervals except the very early cases when the effort is made to sterilize the patient quickly by more intensively using the arsphenamines.

Ten injections of each drug are given which constitutes a series. After a rest period of one month a Wassermann is taken and treatment is again given in the acute cases regardless of the Wassermann reaction. In the latent cases if the Wassermann reaction is negative, treatment is checked.

We regard the rest period as essential, for it allows of the elimination of the arsenic and mercury, both of which have a cumulative action and by pushing we may bring on untoward reactions.

When the patient is susceptible to the neoarsphenamine we use silver salvarsan which acts just as efficiently in sterilizing the patient. In our series of cases we have had as many negative serological results with this preparation as with any of the others. So far we have neither observed any reaction or argyria.

All patients before being discharged receive a lumbar puncture. Stokes and Fordyce and Rosen have shown that 25 per cent of syphilitics show changes in the spinal fluid early in the disease. These patients even with negative physical findings are potential tabetics or paretics.

The patients with neurological changes either symptomatically or serologically are given the routine treatment and if they do not respond to that are given arsphenaminized serum intraspinally which we feel is indicated in some of the cases.

All patients who show a positive Wassermann in the antenatal clinic are sent to us for treatment. The question has often arisen "should syphilis be an indication for inducing an abortion?" We do not believe so, as many children born by syphilitic mothers do not have the disease. But the woman when pregnant should be treated during the entire pregnancy and there is very little likelihood of the child becoming syphilitic. It is inadvisable to start treatment late in the pregnancy as this may cause a Herxheimer reaction. If there are active lesions treatment should be given at any time. The mothers are watched all during the course of treatment as to their kidney function. We make the further change in these cases of giving the drugs separately. The arsphenamine is given first and lately the mercury to avoid the irritation of the latter on the kidneys, and the further accumulation of the arsenical with its possibility of causing dangerous reactions and eclampsia.

It is too soon to report on the prognosis of our cases as the work has not been carried on sufficiently far enough. But it is comparatively easy to sterilize the patient and in 22 per cent of our patients we have had negative Wassermann reactions at the end of one series.

DR. FREDERICK J. MATTHEWS discussed the **Relation of Orthopedics to Gynecology at the Woman's Hospital.**

The Orthopedic Clinic at the Woman's Hospital, was started in May, 1920, to ascertain the cause of backaches in clinic patients, who did not present conditions to warrant treatment or operation. Also, where the correction of the gynecologic condition had been made without relief of symptoms.

Since the opening of this department 43 cases were referred who did not show any orthopedic conditions to cause their symptoms. Three hundred and ninety-two cases have been referred who presented the following orthopedic conditions:

Marked increased lordosis	20	
with short tendo achilles and weak feet	64	
with short tendo achilles	43	
with arthritis	32	
with marked scoliosis	5	
with marked rickets and lateral scoliosis	1	total, 165
Sacroiliac subluxation following labor	10	
with scoliosis	1	
with arthritis	3	total, 14
Sacroiliac subluxation following injury or strain (muscular)	19	
with increased lordosis	1	
with weak lateral or metatarsal arches	4	
with weak metatarsal arches	1	
with arthritis	7	
with short tendo achilles	1	
with short tendo achilles and weak feet (lat. & ant. arches)	22	total, 57
Low lateral and metatarsal arches	9	
with short tendo achilles	15	
with arthritis	3	
with marked rickets and lateral scoliosis	1	total, 28
Low lateral arches only	1	
with short tendo achilles	1	
with short tendo achilles	2	total, 4
Arthritis	23	total, 23
Myalgia	17	total, 17
Lateral curvature	6	
with arthritis	5	
with short tendo achilles	2	total, 13
Long transverse process 5th lumbar impinging on ilium	12	total, 12
Sacralization of transverse process 5th lumbar vertebra	4	total, 4
Short tendo achilles	11	total, 11
Coccyxalgia	2	total, 2
Lumbar Potts	1	total, 1
Flattening of the heads of both femurs relaxation of capsule of hip jt.	1	total, 1
Cases operated on with improvement in symptoms		
Sacroiliac subluxation	12	
Increased lordosis and short tendo achilles	8	
Short tendo achilles	1	
Myalgia	4	total, 25
Cases operated on without improvement in symptoms		
Increased lordosis and short tendo achilles	23	
Sacroiliac subluxation	9	
Lateral curvature	3	total, 35

The increased lordosis cases are mostly fat women with a relaxed abdominal wall and apparently of sedentary habits. They give no history of sudden onset, of pain in the back, but first complain of a tired feeling followed by dragging sensation in the lower lumbar region, then a backache while in the upright position, this is usually relieved by lying down with knees flexed or a pillow under the lower part of the back. Complications vary these symptoms somewhat according to the condition.

The subluxation of the sacroiliac joints due to prenatal conditions, gives a history of onset of sudden severe pain in one or both sacroiliac joints, from three months previous to delivery up to the patient's getting around after labor. The severe pain usually lasts for several days or longer, slowly diminishing. Pain extends in most cases along the sciatic nerve and around the crest of the ilium towards the symphysis pubis on affected side.

The sacroiliac subluxation due to muscle strain or injury gives a history of moving or lifting a heavy object or a fall, followed by sudden severe pain in the affected joint. Symptoms same as previously mentioned.

Backache, due to conditions of the feet, gives a history in most cases of arch trouble not properly relieved, preceding backache.

Backache of arthritic origin usually gives a history of a rheumatic condition and patient shows arthritic changes in other joints. This condition is most often affected by weather changes.

Short tendo achilles appear to play a very important part in the treatment of patients who have this complication as the limitation of ankle motion usually causes a contraction of the erector spinae muscles with increased lordosis to relieve the strain on the calf muscles and the feet.

DR. EDWARD C. LYON presented and discussed the Mortality and Morbidity of Cesarean Section vs. High Forceps Delivery Based on 1000 Consecutive Deliveries at the Woman's Hospital.

This is a preliminary report based on 1000 consecutive ward deliveries on the Obstetrical Service, from which have been excluded all cases of miscarriage before 6½ months of pregnancy. The cases occurred within a little over two years, during which time there were no changes in the personnel of the Attending Staff and none in our attitude towards indications for interference.

It is rare at the Woman's Hospital to have a case admitted which has not been previously enrolled in the prenatal clinic and studied there for several months, so that emergency procedures are not common. Of these 1000 cases 14 were delivered by high forceps and 20 by cesarean section. One of those delivered by high forceps and one delivered by cesarean section, were emergency cases and had had no previous study.

We consider a high forceps delivery to be one where the forceps are applied to an engaged head, the biparietal diameter of which has not yet passed through the inlet. In all of these deliveries the Tarnier axis traction forceps was used to bring the head to the pelvic floor, after which the Tucker-McLane instrument was often substituted. All cesarean sections were abdominal with a median incision,—part above and part below the umbilicus, and with the uterine incision in the anterior wall and not low down.

Both maternal and infant mortality will be considered and under morbidity any mother or infant who had a postpartum temperature of 100.6 or over, or any

complicating condition which detained either patient in the hospital beyond the regulation time will be reported.

In the 14 cases delivered by high forceps there were no maternal deaths.

In the 20 cases delivered by cesarean section there were three deaths, as follows:

CASE 1.—Toxemia, eclampsia, acute suppression of urine, edema of the lungs. This patient was in the hospital for observation and treatment of toxemia for six weeks prior to delivery, in the hopes of obtaining a living child. She showed a satisfactory improvement and induction did not seem indicated. Normal pelvis, history of one miscarriage, no labors. At eight months she spontaneously went into labor, membranes probably unruptured, though this could not be definitely determined. Poor pains, slow progress, rigid cervix admitting one finger. Insertion of Voorhes bag advised. This was followed by severe convulsion, rapid change in patient's condition for the worse, blood pressure rose from 130/80 to 210/100. Catheterized specimen of urine showed 65 per cent sediment of albumin on boiling with acetic acid. Cesarean done as quickest means of emptying the uterus, uncomplicated operation, one convulsion postpartum. Condition became worse and patient died 85 hours postpartum. No autopsy.

CASE 2.—Peritonitis. Patient never in prenatal clinic, admitted as emergency, interference outside the hospital. Eight months' pregnant, vertex, normal pelvic measurements, history of one normal living child. Two days before admission severe hemorrhage, was packed by physician at her home; packing removed next day. Subsequent hemorrhage and patient was admitted to the hospital. Patient in good general condition—almost complete placenta previa, two vaginal examinations, uncomplicated operation. Patient died 88 hours postpartum. No autopsy.

CASE 3.—Peritonitis, septicemia, positive blood culture. While in prenatal clinic patient under treatment at St. Luke's Dispensary for chronic pulmonary tuberculosis, poor general condition; at term, vertex, normal pelvic measurements; history of one miscarriage; one previous cesarean section. History showed patient was operated on six hours after onset of labor, indication for which could not be determined. Spontaneous, dry labor—patient given test of labor, with four vaginal examinations in hospital. Uterine inertia, rigid partly dilated cervix, persistent O. P., exhaustion of patient. Uncomplicated operation. Patient died 73 hours postpartum. Diagnosis confirmed by autopsy.

Mortality, infant. In the high forceps deliveries there were two stillbirths, in both cases baby alive before patient was taken to the delivery room. One of these was complicated by a prolapsed cord and both were persistent occiput posterior positions. There were two deaths. One died on the second day from cerebral injury and was a case of persistent occiput posterior. The other died on the sixth day from the same cause. The former had a marked asphyxia pallida and was resuscitated with difficulty. The latter had a moderate asphyxia livida and was resuscitated with ease. In the cesarean sections there was one death 7½ hours postpartum from atelectasis. Operation for former ventral fixation, discharge of meconium noted before operation.

Morbidity, maternal. In the high forceps delivery three cases showed a reactionary temperature not extending beyond the second day. Five cases had a temperature due to sapremia, four with a temperature one day, one with a temperature three days. All were treated by posture only and discharged in good condition.

In the cesarean section cases all showed the usual postoperative rise in temperature but in addition to this there were four cases with a temperature due to sa-

premia. These were treated by posture only and discharged in good condition. One case of pyelitis, one of saphenous phlebitis, were discharged in good condition. There were three cases of wound infection, all superficial and involving only the skin and subcutaneous fat. Two were discharged in good condition and one unimproved, this patient being operated upon because of an epithelioma of the vulva.

Morbidity, infant. In the high forceps cases there was one case of facial paralysis, unilateral, much improved at time of discharge. In the cesarean section cases there was one case of fracture of the middle third of the femur due to difficult extraction of the baby and a tight uterus. Firm union on discharge. Slight deformity.

DISCUSSION

DR. JOHN O. POLAK.—If I understood Dr. Hoch correctly, he made the statement that there was danger and no advantage in treating syphilis late in pregnancy. That is rather at variance with the experience that we have had in our clinic, no matter at what stage of pregnancy the syphilitic appears and receives treatment, there have not been any untoward results, and the advantages have been very considerable, particularly for the baby, even when those patients had but very few injections.

The second point I would like to refer to was a point brought out by Dr. Lyon. It was rather interesting to me to note the record of high forceps he reported. This is an operation I had supposed had been relegated to past history. He modified his statement as to high forceps, but yet was very clear in stating that the largest diameter had not passed the brim, and as these cases had all been followed in the prenatal clinic, it seems to me that 14 cases of high forceps was an extremely high incidence, and that the loss of four babies was directly due to that procedure.

DR. JAMES V. RICCI discussed **Commercial Preparation of Gum Glucose and Demonstration of Its Effect on the Blood Pressure of the Rabbit.**

1. *The Preparation of Gum Glucose.*—Gum acacia and glucose are given intravenously at the Woman's Hospital to prevent and to combat shock incident to operation. A solution of six per cent gum acacia and twenty per cent glucose sterilized in sealed ampules, each containing 300 c.c. is prepared by Squibb and Company of New York and is kept ready in the hospital on ice for emergency use. When desired for use, the ampule is placed in a basin of hot water just below the boiling point for three to five minutes. The lowest point of the ampule is then sterilized with alcohol flame, the glass filed with sterile file, and the rubber tubing attached. A graduated glass pipette with a connecting "Y" will give the rate of flow per minute, which for a patient of 150 lbs. should be 3 c.c., for 200 lbs. 4 c.c., for 100 lbs. 2 c.c. The rate is based upon the physiological rate of absorption of glucose, which varies with the body weight of the patient. A thermometer in the tubing shows the temperature of the solution which should be approximately 105° F. For the maintenance of a constant heat level we depend on a specially constructed electric apparatus, so fashioned as to envelop both ampule and rubber tubing. One ampule is sufficient for an ordinary operation; if need be a second ampule may be attached in a similar manner.

2. *Object of Gum Glucose Injections.*—The object is to maintain blood pressure by maintaining the blood volume, not to increase the tension in the arterial walls



Fig. 1.

as is done by adrenalin or digitalis, and thereby causing a diminution in the flow of blood to the tissues and especially to the kidneys. Shock may be caused by hemorrhage from the body or by hemorrhage into the patient's capillaries—that is, concentration and stagnation of cells in the capillaries, and loss of plasma from the circulation. If by hemorrhage from the body, gum glucose, as it is a colloid, will not leave the capillaries, but will attract the remaining blood into the blood vessels and tide the patient over an interval until a donor can be obtained for a blood transfusion. If shock is caused by blood lying stagnant in the capillaries due to the alteration of the vessel walls, gum glucose will attract the plasma back into the blood stream and restore the blood volume.

Sir William Bayliss of London has demonstrated that a solution of gum acacia will raise the blood pressure in cats suffering from shock; the accompanying Kymograph tracing (Fig. 1) shows the same result from giving intravenously, solution of gum glucose to rabbits which I had previously rendered in a state of shock.

DR. EDWARD A. BULLARD presented a Report of Two Cases of Menstruating Fistulae.

CASE 1.—Mrs. I. H., colored, age thirty, well and robust, admitted to Woman's Hospital, July 7, 1921. Menstrual onset at 13, regular, every 28 days, 7 days' duration, painless, profuse. No miscarriages, one child born in Jamaica, Jan., 1921, by instrumental delivery at term, but no details known. Very stormy puerperium with high fever. During the fourth week a diagnosis of pelvic abscess and toxic insanity made and patient taken to Kingston Hospital. A large abscess was found in the pelvis which was ruptured during the manipulations and before more could be done the patient was *in extremis*. A smaller abscess was promptly evacuated. The sac of the large one on the left side was brought up and sewn into the wound and after the insertion of cigarette drains the abdomen was rapidly closed. Both appeared to be broad ligament abscesses. The symptoms rapidly improved. After a week an écraseur was applied about the protuberant remains of the sac and the mass sloughed off. Patient left the hospital in about five weeks in good condition except for a discharging sinus in the scar.

A slight purulent discharge from this fistula has persisted up to the present time. Menstruation of the same type as before pregnancy appeared in April and after one day of vaginal flow menstrual blood oozed out of the sinus onto the abdominal wall and continued to do so until the vaginal bleeding stopped. This discharge has appeared on the second day of each succeeding menstrual epoch—of which there have been three—and has persisted in moderate amount until the vaginal flow ceased. Patient sought operation for the cure of this sinus; is otherwise in excellent health.

Examination showed a five inch midline scar below umbilicus, in the lower end of which is a sinus admitting an ordinary probe downward and backward about five inches. The uterus feels normal but somewhat fixed to a right-sided, soft, globular mass about three inches in diameter.

Urine and blood normal. Urethral smears and Wassermann, negative. Rubin test for tubal patency tried with the entrance to the sinus submerged under a little pool of water. Under 50 mm. mercury pressure the CO₂ gas bubbled out of the sinus and when patient sat up the classic sign of shoulder pain was noted and gas seen under the diaphragm by the fluoroscope. This proved that the sinus connected with the uterine cavity and made it seem certain that the other tube was patent.

On July 15, 1921, a supravaginal hysterectomy, bilateral salpingoophorectomy, excision of salpingoabdominal sinus and appendectomy done. By long elliptical incisions the whole scar and sinus were excised in one mass. On entering the abdomen it was seen that the sinus was the left fallopian tube with its fimbriated end embedded in the scar. The tube was slightly enlarged and the lumen a bit dilated but there were no adhesions about it. The left ovary a little enlarged, buried under adhesions to the uterus, and on dissection sterile pus exuded. The right ovary was transformed into a cyst of about four inches diameter. The right tube ran across

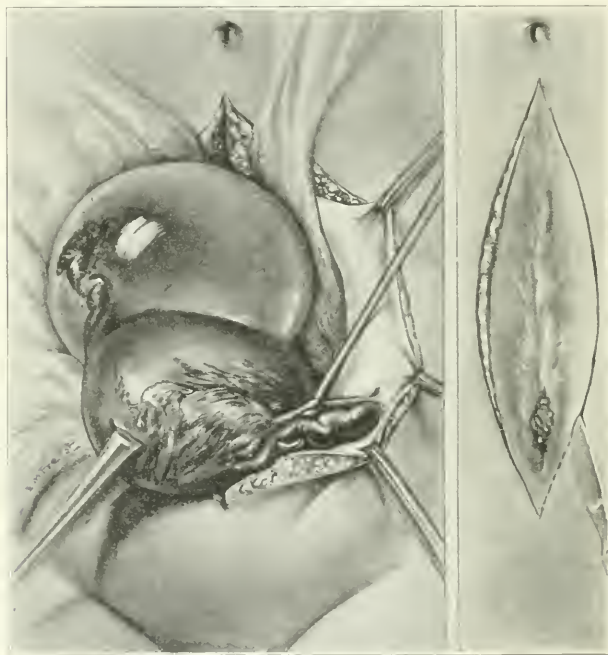


Fig. 2.

the top of the cyst, appeared normal, and the Rubin test had already proved its patency. Light omental and intestinal adhesions to the back of the cyst and the uterus (Fig. 2). Uterus, appendix, kidneys and gall bladder normal. It appeared unwise to consider conservatism and accordingly complete ablation of uterus and adnexae was done. Prophylactic appendectomy also done. Because of the spill of pus from the ovary a cigarette drain was inserted and the abdomen closed.

Patient had a normal convalescence, the highest temperature being 101° rectal. Discharged on the twentieth day, drainage tract closed, wound healed, pelvis normal to palpation.

Microscopical examination of the offending tube showed "thickened fibrosed wall

with marked edema and congestion. The blood vessels engorged, their walls thickened and sclerosed. Some areas of mucous membrane are infiltrated almost exclusively with round cells, others show polymorphonuclear leucocytes and a large number of plasma cells. Small abscesses are frequent. Also marked perisalpingitis. The other tube presents the same picture. Uterus moderately fibrosed and endometrium hyperplastic."

CASE 2.—Mrs. M. X., age 31, entered Woman's Hospital, March 12, 1922. Married eight years, four children, all normal labors, and no miscarriages. Menstrual history was entirely normal.

In December, 1920, patient's last child was delivered normally, but puerperal sepsis followed. She got up in three weeks but constant pelvic pain and poor health persisted until she was compelled to submit to laparotomy on April 17, 1921 at the Flushing Hospital. The details of the operation were not obtainable but she understood that "an ovarian abscess" was found. A drainage sinus remained which has never healed. In July, an abscess appeared in the left groin and after incision this was found to communicate with the main fistulous tract. Three more sinuses opened soon after on the left lower abdomen and all five continued active.

The baby was weaned in August, 1921, and the mother's general health improved. In December, 1921, menstruation appeared for the first time and lasted three days. During all of this epoch blood resembling menstrual blood came out of the original sinus quite freely and recurred for three months that followed until her operation in Woman's Hospital in March, 1922. More blood discharged from the fistula than from the vagina but the vaginal flow persisted nearly a day longer. During the intermenstrual intervals there was a constant but very slight seropurulent discharge from this sinus but never any blood. All of the other sinuses continued to discharge pus in moderate quantities but none of them showed any sanguinous flow during menses.

The Rubin tubal patency test was done and under very low pressure the gas passed into the uterus and out of the sinus in the laparotomy scar, but none passed into the abdominal cavity.

On March 16, 1922, Dr. Herman Grad operated. The sinus in the laparotomy scar was first probed but no information gained and abdomen then opened through the scar. A large tuboovarian inflammatory mass occupied the left side of the pelvis adherent to small intestines, sigmoid, bladder and lateral pelvic wall. The left tube ran from the mass upward and forward to be attached at its fimbriated end in the old scar. This was the menstruating fistula. The other four sinuses communicated with the inflammatory mass separately across the top of the bladder or down the lateral wall of the pelvis. The greatest difficulty was encountered in the release of adhesions and entire excision of the left adnexa and these sinuses. A loop of small intestine and the sigmoid were torn and repaired. The right appendage had been removed at the previous operation. Abdomen was closed with drainage.

The wound became badly infected and required several counter incisions.

The laboratory report stated that the tube wall was thickened, lumen containing purulent exudate. Mucosa almost entirely replaced by an exudate of lymphocytes and polymorphonuclears. One area still shows thickened rugae, invaded by plasma cells as well, with considerable hemorrhage. Ovarian tissue partly necrotic.

Menstruating fistulae have been reported by Bland, Thomson, Landsberg, Bond and Thorn. But when we bring up the question of the origin of these periodic bloody discharges and their nature we plunge at once into the old unsettled problem. "Does the tube menstruate?"

Many of the cases of menstruating tubal sinuses reported in the literature are

of no assistance in the determination of this problem because the tubes, as in the two cases of our own report, were pathologic, or because their condition might have been influenced by uterine or other adjacent pathology. As Novak rightly claims "To be of value in such a study the removed tubes must be free from pathological changes, they must not be injured in removal, and they must be placed at once in the fixing fluid. In addition there must be an accurate history of the case, especially from the standpoint of the menstrual dates and the freedom of the patient from any condition, whether general or local, which might influence the periodicity of menstruation." No large series of cases has been worked up in this manner.

There is considerable variety of opinion on tubal menstruation. Whitridge Williams says that the tubes "show distinct cyclical changes both in the epithelium and connective tissue" but "ordinarily take no part in the menstrual function." Graves thinks the tubal mucous membrane probably does not share in the bleeding as a rule but that tubes inspected at operation during menses have sometimes indicated an associated tubal menstruation. Delporte investigated many normal tubes removed during menstruation. He found diapedesis of red cells and expulsion through the mucosa into the lumen of the tube, a condition resembling menstruation, but he did not consider it a true menstruation. Bond studied the uterine ends of quite a few normal tubes which had been removed during menstruation in operations for cystic ovaries, fibroids or retroversions. He found red cells passing through the mucosa into the lumen of the tube, and thought certain cases of hematosalpinx without pregnancy could be thus explained. He felt sure that the blood found in the tube was not a regurgitation from the uterus because the tubal menstruation preceded the uterine in some of his cases. DeLee thinks some degree of tubal menstruation probable, because tubes fastened into abdominal incision have periodic bloody discharges, hematosalpinx points to this origin, and a decidua menstrualis was found in the tube by Arendt. Goffe found after vaginal hysterectomy the uterine end of a tube attached to the vaginal stump, and menstruation occurred into the vagina several times until the tube was thoroughly destroyed by cautery. Holzbach showed various periodical decidual changes in the tube. Leopold and Martin found small areas of epithelial desquamation in the tubal mucosa, the epithelium of which, however, was renewed much slower than during menstruation.

On the other hand many observers seriously doubt genuine tubal menstruation. Jangeroos examined many tubes taken out with the uterus for cervical cancer and never found blood in a normal tube. Crossen admits that the general congestion at menses may result in a slight effusion of blood into a normal tube but thinks menstruating fistulae are due to the pathologic condition of such tubes. Moraller and Hoehl admit the problem is not settled. They think there is usually no bloody secretion in the tubes at menses. They believe that nearly all observations that have been made on the subject are open to criticism because they were made upon pathologic tissues. Frankel says, "A true menstruation in the sense of typical mucous membrane changes as described by Hitschmann and Adler does not occur in the normal tube. Hemorrhage into the tubal lumen always represents a pathological process."

DISCUSSION

DR. ROBERTS L. DICKINSON.—Bearing on the matter of tubal menstruation, I would state that I sterilize patients in the office by occluding the tube and passing a sound with a cautery tip on it. This produces a slough and closure by a circular scar, of the ostium uterinum and either a hydrosalpinx or a hematosalpinx results in about one-half of the cases for a little while. In examining them right after menstruation with the idea that they may fill up with menstrual

blood, one finds that tubes do not continue filling month after month, which shows that the tubes do not go on menstruating. If tubes menstruate scantily and only a few drops work back into the peritoneum, the peritoneum is able to take care of it. Therefore it would seem there cannot be any large amount of tubal menstrual blood, if any.

DR. HERMAN GRAD.—Dr. Bullard did not mention the fact that this patient stated that she menstruated eight different times through this tube and that the menstrual flow ceased about two days before the uterine flow ceased. It is of interest to know that the duration of the tubal escape was not as long as that from the uterus.

DR. GILMAN S. CURRIER presented A Compact Apparatus for Determination of Patency of the Fallopian Tubes in Sterility and Method of Use.

A very small tank of carbon dioxide in liquid form holding 8 c.c. at a pressure of 1000 pounds per square inch is contained in a shell which forces it down upon a hollow needle perforating the sealed end of the steel capsule (tank) and fitting the shoulder tightly against a rubber washer. Thus the gas is released and ready for use, the rate of flow to be regulated by a delicate needle valve. One cylinder will suffice for two or three patients or more if they are examined the same day, but, inasmuch as the tanks are worth only a few cents a piece—new and charged—it is simpler to use a new tank for each patient.

A quart wide-mouthed bottle with a two-holed rubber stopper is filled with water to the level shown in the illustration. Through one opening of the stopper comes the glass tube of the volumeter (used by Wallace & Tiernan for measuring chlorine and used, inverted, for irrigation in the Carrell Dakin treatment of wounds in the war.) This glass tube contains a syphon and is of about 50 c.c. displacement, used to measure the volume of gas passed. Each time the hollow glass chamber is emptied (which happens suddenly after gradual filling) 50 c.c. of gas have passed, seen bubbling through the water. This gas passes through the glass Y-shaped tube in the second hole of the rubber stopper to a U-shaped double column of mercury through the one arm and to the patient through the other (Fig. 4).

A funnel ("thistle") on the top of the tube containing the mercury allows it to be poured in if carried around in a bottle. There is a millimeter sliding scale on the tube containing the mercury on which zero is made to correspond to whatever the level of the mercury may be. The free arm has a bend to support the rubber tube connecting the volumeter and gas tank.

From the free arm of the glass Y-shaped tube the gas passes in rubber tubing into which is inserted, somewhere in its course, a two-way pet-cock allowing it to be directed on into the patient or to escape at will. A flexible hollow tin sound No. 15, perforating a rubber acorn tip to a urethral (prophylactic) syringe constitutes the terminal attachment of the rubber tubing. The advantages of this over the steel sound are two-fold: better coaptation of the rubber against the cervix can be obtained because it can always be made perpendicular to the cervix by bending and, secondly, the sound can be curved to suit the contour of the uterine cavity whether anteфлекed or retroфлекed.

The outfit being portable (Fig. 3) can be carried to the home, office or operating room, whether it be encased or in a hand-bag. That there are no ill effects from the

procedure is shown by the fact that out of over 600 cases at the Womau's Hospital no harm has resulted. Inasmuch as it is necessary to introduce the flexible sound into the uterus, sterile surgical technic is necessary. The contraindications to this invasion of the uterus by a foreign body would prevent use of the apparatus, the most objectionable feature being a badly diseased cervix, although no harm has been experienced from chronic conditions of this kind but the test is obviously superfluous as endocervicitis should be cured before other causes of sterility are sought. Acute salpingitis would naturally contraindicate the test more from the point of view of inadvisability of intrauterine manipulation, than anything conveyed by the gas into the abdominal cavity, for the gas would not pass, as also in the premenstrual period when patent tubes may seem obstructed.

The cylinder is introduced into the shell (fitting only one way) and with the needle-valve closed, the shell is screwed down as far as possible, pressing the cylinder by the hollow needle, freeing the gas.

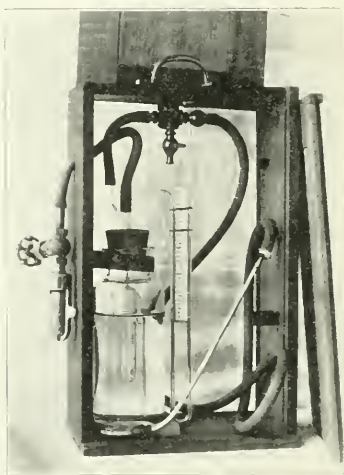


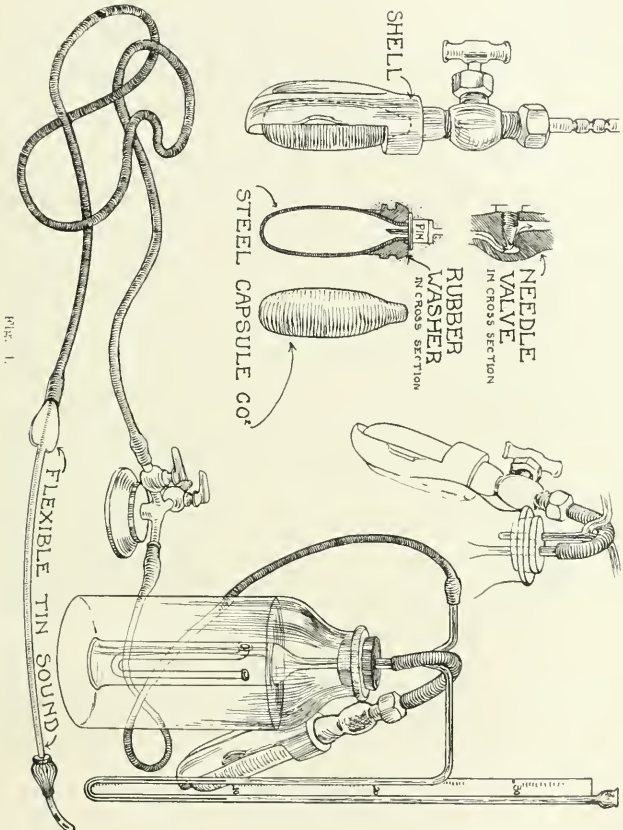
Fig. 3.—Carrier apparatus for determining tubal patency.

The tank is then attached to the volumeter by rubber tubing and the flow of gas so regulated, by turning the needle-valve, that with both sides of the two-way pet cock closed the pressure as shown by the mercury manometer does not rise too rapidly for safety, a rise of 5 mm. of mercury per second being a good standard, which, once set, is allowed to continue until the test is finished; the pet-cock being opened, the gas is allowed to escape till ready for the test so that the pressure no longer rises or the mercury will be blown out of the tube if the pressure is allowed to rise above the limit of the scale.

After iodination of the cervix and insertion of a bivalve speculum, to introduce the sterile sound the tip of which is bent to suit the contour of the uterine canal and the rubber acorn about 1 to 1½ inches from the tip, the cervix must be grasped with a tenaculum which should of course be outside the canal in order not to interpose between the rubber and cervix. Novocaine may occasionally

be necessary for this but usually can be dispensed with. The whole procedure can, on the other hand, in a very sensitive patient, be done under general anesthesia, gas or ether as it is not necessary to rely on any subjective symptoms on the part of the patient (later taken up as right shoulder pain).

When the rubber on the sound is firmly pressed against the cervix no gas



escapes from this source. If imperfect coaptation exist it is detected by gurgling and sense of vibration felt through the metal (tenaculum and speculum), and an irregular and unsteady drop in the column of mercury.

When the pet-cock is closed the pressure as shown by the column of mercury will rise constantly till obstruction is overcome (provided no leak is allowed from the cervix) which, in the normal case will be around 60 to 90 mm. of mercury and will not rise higher although in a normal case it will first occasionally

reach a point somewhat above the level set (90) but promptly drop back to that level and stay there. If a stethoscope be applied to the lower abdomen above the pubis, gas can be heard passing through into the peritoneal cavity, all of which is quite painless.

Patency can be determined after as few as two or three excursions of the volumeter—that is—after 100 to 150 c.c. of gas have been passed into the abdomen. A greater volume is usually employed unless the patient is very sensitive. A maximum of 300 to 400 c.c. is often allowed to pass into the abdomen. Then, if the patient be conscious, which is not at all necessary, and sits up, she will usually have right shoulder pain due to subdiaphragmatic irritation by the gas, which it is easy to demonstrate by the fluoroscope in the form of a white line of separation between the liver and diaphragm, but too awkward for clinical use.

In partially occluded tubes, as those chronically diseased or the engorgement just previous to menstruation in normal tubes, the pressure rises up to 150 mm. more or less showing difficulty for the gas to pass through.

In tubes that are completely closed the pressure goes steadily up as high as one cares to allow, which upper limit has been found to be 200 mm. mercury, as rupture is possible above that pressure. The nature of the obstruction will affect the behavior of the mercury column; thus it has been found to go up to 200 mm. three times and the third time just as it would reach the 200 mark, it would drop to 60 or 80 and remain there showing patency established—probably velamentous adhesions broken up—showing the therapeutic possibilities. If in such a case the procedure were carried out once a week, later work will probably show retained patency and therefore cure some cases of obstruction without operation.

This brings up the point that in all partially or completely obstructed cases it is well worth while going through three trials at the same time and at intervals. Of all these signs, the behavior of the column of mercury, the right shoulder pain and the fluoroscope, the first and last are the only two that are absolutely constant, and the fluoroscope is too impracticable for office use when the pressure readings will suffice.

The absorption of the carbon dioxide gas in the abdomen is very rapid—much more so than oxygen—and comparatively painless. There will be very little bloody discharge from the cervix as a result of the test, no more than from treatment of that organ.

DR. ALBERT H. ALDRIDGE presented **Insufflation of Uterus and Fallopian Tubes. Report of 600 Cases Examined by the Rubin Method.** (For original article see page 53.)

DISCUSSION

DR. I. C. RUBIN.—Dr. Aldridge started at a point where the method was practically established. I had passed through the experimental stage and had had some undesirable results, as, for example, more pain, pressure symptoms and occasionally syncope, due to too large amount of gas being used and perhaps also to improper selection of cases while I was developing the matter of pressure rate flow. I have nothing but the greatest admiration for Dr. Aldridge's work, and his results are so many and so varied that I could take up a great many of these points in a very lengthy discussion, which is out of the question here.

There is one point which I would like to touch on in connection with the in-

genious device presented by Dr. Currier, which I think has filled a want in the source of gas supply. In watching the action of the little tank I find it will deliver a great deal more gas than is required for two or three cases. If used judiciously, I think it can be used for quite a number of cases.

DR. WILLIAM T. KENNEDY presented a paper entitled **Radiography of Closed Fallopian Tubes**. (For original article see page 12.)

DISCUSSION

At the conclusion of a lantern slide demonstration DR. RUBIN said:

There is only one more point about these cases to which I would like to direct attention. Without the use of opaque solutions, but with the use of the gas test we are in a position to say whether we are dealing with complete closure of both tubes or partial patency, at least one tube being open. I believe we are also now able to tell whether we are dealing with unilateral stenosis or stricture or complete unilateral occlusion in many cases without having to resort to the injection of chemical fluids into the uterus. Dr. Aldridge brought out the point that any pressure above 150 millimeters of mercury indicates stenosis and a pressure above 200 means occlusion. A very interesting symptom which I have found in a fairly large series of cases indicative of a partial stenosis or of complete closure on one side, is the distention pain lateral to the uterus produced by the intrauterine insufflation. I found in checking up this work that where the colic is suprasymphyseal, it is apt to be uterine colic and the gas does not enter the tubes beyond the isthmi and this fact signifies that the closure is at the uterine horns. When the closure is on one side alone and near the abdominal end of the tube as in a case of hydrosalpius there is a distinct pain on the side on which the closure is present, the manometer, of course, indicating a relatively high rise of pressure on the mercury column. When the pain is bilateral and is associated with a high rise of pressure it is indicative of closure of both tubes at or near the fimbriated ends, and I have been following up these points and comparing them with the findings at laparotomy. That is one of the chief reasons why I have not used this opaque solution in the uterus further and I am glad to be able to state my experience here. I feel that perhaps we should check it up with the laparotomy findings.

I would like to refer to one particular case, a woman now at the age of 26 years, married five years, but sterile, was operated at the age of 15 or thereabout, for a supposedly appendiceal inflammation. The patient was married eventually and was operated by another surgeon for what he thought were closed tubes and to his surprise, found that both tubes had been ablated. This woman is without tubes and is strongly desirous of having a child, and now this procedure can be tried in order to see how much of a stump she may have because she is absolutely bent upon having something done which will improve her chances, no matter how slight they may be. It is in such a case as that which I have just narrated that the introduction of an opaque solution is of great value.

DR. ROBERT L. DICKINSON.—Dr. Cary, I believe, has the priority claim in this matter. He made the suggestion and I used injections of argyrol, and Dudley Roberts took the pictures. In patients rather obese the shadows were poor; secondly, argyrol, not as good a material as sodium bromide, gave poor shadows. When the material goes through the tubes, it diffuses itself into the pelvic peritoneum and obscures the result. In a series of 20 cases, 17 had occluded tubes,

one was partially occluded, and in one in which the fluid went through there were two confusing shadows on one side of the pelvis only.

Now, what we want Dr. Kennedy to elucidate is what will happen in *open* tubes when you throw this fluid through. We want to hear whether, then, the diffusion among the bowels in the lower part of the peritoneal cavity will give you clear pictures or obscure pictures.

Secondly, I might say that there is a simpler method of getting the same result without the cost of the x-ray. You make a bimanual examination and find no evidence of distended tubes. You throw air into the uterus with a pipet and manometer and more goes through than the uterus itself will hold. You then make a bimanual and find you have produced an artificial hydrosalpinx. You, therefore, with your fingers determine some of the things you find in Dr. Kennedy's plates.

The tubal isthmus has been referred to as closed. I believe in a study of the literature that you can find no instance of such a thing as a really grown together ostium uterinum of the tube; that is to say, a closed opening in the sense that the sides are pressed together so firmly that a pressure of 200 will not open it, is possible, but an actual agglutination, which, on section, shows that there is a structural blockade, is said not to happen. I have made some search of the literature in an attempt to find a section which would show a tissue growth closure, but have not succeeded in finding any. Apposition yes, but actual anatomical closure no.

DR. HIRAM N. VINEBERG.—I want to sound a note of warning. One of the great advantages, to my mind, of the Rubin test is that it will do away with a great deal of indiscriminate dilatations, stem pessaries and Dudley operations.

Now, there is just as great danger if not greater if every woman with closed tubes, after being subjected to the Rubin test, should have her abdomen opened. This may do a great deal more harm than we have been doing in the past.

I think Dr. Aldridge deserves great credit for having raised the question as to whether in cases of closed tubes it is worth while to open the abdomen and try to open the tubes for the sake of conception. I think we should emphasize that very point tonight. Now, nature will do things of itself which we with our surgery very often cannot do. How often does it happen that men have tied off tubes by surgical procedures and the patients have become pregnant? Probably a larger percentage than those that had tubes opened by surgery, because in this one instance the tubes were healthy and in others they were diseased.

I reported a case here some years ago in which a pyosalpinx had been removed and an ectopic pregnancy had occurred in the very short stump of the tube that had been amputated near the cornu of the uterus. So, while I feel the work reported here tonight is of great value, I wish to utter a note of warning that not every woman who comes to the doctor's office with tubes that are found to be closed should be advised to have her abdomen opened merely for the sake of becoming pregnant.

DR. GEORGE GRAY WARD.—This work of Dr. Kennedy's, which supplements, of course, Dr. Rubin's original work, I consider has a distinct value. I recognize what Dr. Vineberg has said as a general proposition, but all of us see cases where the patient practically insists that something shall be done on account of her sterility. Just such a case was one of mine that Dr. Kennedy showed on the screen. The patient was a Filipino woman who was married for five years and had never been pregnant. She had had a gonorrheal infection and her husband admitted that he was at fault. They were willing to do anything to have a child. It was an obsession with the woman that she must have a child and she insisted that some-

thing be done. The case was tested by Dr. Aldridge and the tubes were proved to be positively closed. Dr. Kennedy then x-rayed her, which plainly showed complete obstruction at the uterine cornu on the right side and a hydrosalpinx with obstruction at the fimbriae on the left side. The condition was explained to the patient and to her husband. A laparotomy was consented to and I believe it was perfectly justifiable. The findings at operation were identical with those shown in the picture taken by Dr. Kennedy. The right tube was apparently closed throughout and had a nodule at the uterine horn. It was merely a small tube, just like a cord, which had been destroyed by the disease. A satisfactory salpingostomy could not be done on that side. The other was a hydrosalpinx going back of the uterus, and there were adhesions present. On that side I did a salpingostomy with a wide $\frac{3}{4}$ inch opening and passed catgut down into the opening, suturing it there in the hope of maintaining the patency. The patient is coming in for a further gas test within a few days and if Dr. Aldridge succeeds in putting the gas through, we will consider that it was worth while to do what we did for her. She was relieved of her pelvic pain and as far as future pregnancy is concerned, she is better off than she was.

The valuable point that Dr. Kennedy has brought out in his paper is that when both tubes are shown to be occluded by the Rubin test, it is important to make a diagnosis as to the location of the occlusion in each tube in order that we know whether we can offer the patient the operation of salpingostomy with any justification. When the obstruction is at the uterine cornu the operation is nearly hopeless, while if at fimbriated end of the tube, we have some prospect of success.

DR. ROBERT L. DICKINSON.—I would like to ask Dr. Rubin or Dr. Aldridge if they have seen any case in which tubes have been opened by gas and pregnancy has followed.

DR. C. G. CHILD, JR.—I am not at all pessimistic about the operations for closed tubes. I believe they are fully justifiable. I believe that, although many failures follow such operations, as many failures follow all operations in surgery, the failures following the operations for opening the tubes cannot be classed as dangerous to the life of the patient. I have had an encouraging number of cases which led to successful issues, the birth of a living child having followed, several times within ten months after the opening of the tubes, and subsequent children having been born after that time. I have now an encouraging number of children so born.

I feel that all closed tubes should be operated on, if there is no contraindication and the general condition of the patient permits, and provided the husband is fertile.

DR. ALDRIDGE (closing).—In answer to Dr. Dickinson I would say that I know of twelve cases examined by the Rubin method which subsequently became pregnant in from one month to one year after examination. Seven cases were patent and five partially occluded at time of examination. Five of the cases had some gynecological operative procedure done between the time of the test and the time when pregnancy occurred.

One case of one child sterility became pregnant almost immediately after examination. She had been married eight years and sterile following delivery one year after her marriage. She was anxious for a second child and had resorted to various methods of treatment by numerous doctors without result. When she was examined by the Rubin method a high level of pressure was required to start the flow of gas through the tubes. When the gas once began to enter the abdomen it passed through the tubes at a very low level of pressure. Apparently the gas under

pressure had relieved some obstruction leaving the tubes freely patent. The patient had one period before she became pregnant and has since been delivered. I think that I am justified in giving the method credit for this pregnancy.

It is impossible to say in how many of these cases the Rubin method has opened the tubes and allowed pregnancy to take place. It is possible that tubal obstruction may be overcome in a very small percentage of cases, and thereby allow pregnancy to take place.

OBSTETRICAL SOCIETY OF PHILADELPHIA

MEETING OF FEBRUARY 1st, 1923

THE PRESIDENT, DR. WILLIAM E. PARKE, IN THE CHAIR

DR. ALICE WELD TALLANT presented **A Study of the Results in Face Presentations.**

Anyone who wishes to acquire experience in the management of face presentations must be possessed of a goodly store of patience. Even at the rate of the generally accepted estimate of 1:250 cases, data accumulate slowly. Personally I have found these presentations far less frequent in my private practice than in my hospital service. Our figure for the combined hospital and outpatient service of the Hospital of the Woman's Medical College of Pennsylvania show thirty-nine cases in the last 10,000 confinements, a percentage of 0.39. For this study I have added two more, making a total of forty-one. In our series the left mento-anterior stands first, but this is by no means the universal rule.

Of far greater importance is the etiology, since the conditions which cause the malpresentation will also play their part in the treatment and outcome of the cases. I am convinced that the management of face presentations is largely based on these conditions and that to lay down a method for the conduct of a face presentation *per se*, without considering them, is illogical.

Take for a moment the commonest causes, disproportion between the child and the pelvis, malposition of the uterus (usually due to lax abdominal walls in a multipara), and abnormalities of the fetus, and apply them to vertex presentations. No one would dream of saying that the same method of treatment should be carried out in a case of contracted pelvis in a primipara and one of relaxed abdominal wall in a multipara with large measurements. Therefore when a diagnosis of face presentation is made, the next thing is to discover, if possible, what has caused it, before weighing the merits of version vs. conversion, expectant treatment vs. interference.

Multiparity, a factor in the etiology which is always stressed, is the first striking point in our series, as might be expected, with thirty-five multiparae to six primiparae, a proportion of nearly six to one, or 85.3 per cent. One must not be led astray by these figures, however, for in our clinic the multiparae outnumber the primiparae about three to one, so that our conclusion is that a multipara is only about twice as likely to have a face presentation as a primipara.

Of the six primiparae, four had contracted pelvis, a point which bears out the statement that a face presentation in a primipara should always suggest the presence of disproportion. Among multiparae disproportion also plays its part, but more often on account of the large size of the child. Twelve in our series had children weighing over eight pounds (the largest an anencephalic fetus of twelve-

and-one-half pounds) and only three showed pelvic contraction of any marked degree.

The fact that anencephali were found five times, a proportion of nearly one to eight, must not be overlooked, and when we add two more malformations and two macerated fetuses, we have surely enough data to justify the contention that the fetus is often at fault, as well as to explain why the gross fetal mortality is bound to be high. Coiling of the cord about the child is also to be listed, but the diagnosis is so seldom made in advance that it is of little practical value. In one of our cases the cord was twice around the neck and also around both feet, and in another, around the neck and body.

The effect of the malpresentation is on the average to prolong labor somewhat, but rapid labor is often noted. The increase in the length of labor is not marked if the comparison is made between face and vertex presentations showing similar accompanying conditions, as dry labor, small pelvis or large child. Early rupture of the membranes is possibly a little more frequent, but again, not strikingly so. As to the perineal lacerations which are so often emphasized as a result of the delivery, I am in complete accord with Cragin's dictum that "much tearing of the perineum is not necessary". In only two of our forty-one patients did any laceration occur and in both cases a single suture sufficed for the repair. As one of these patients was delivered by version and extraction, the perineal tear had no direct relation to the birth of the head in face presentations.

As far as the outcome of face presentations is concerned, the day has long gone by when operative measures were supposed to be a necessary accompaniment of nearly every case. The writers of the present state or quote the proportion of spontaneous deliveries as from 80 per cent (Smyly) to the astonishing 98¾ per cent of Boer. At the same time the reader must be struck with the fact that these same writers note a higher maternal mortality than in vertex presentations and specially emphasize the grave prognosis for the child, giving the average mortality as from 10 to 15 per cent, although lower figures are quoted from a few individual clinics. That anomalies of the child are not largely accountable for this high death rate may be inferred from Cragin's statistics for the Sloane Hospital, in which, after deducting monstrosities and macerated and nonviable fetuses, the corrected mortality remained at 17 per cent. It must be borne in mind, of course, that hospital figures will always run high.

The conclusion is that face presentations, even when ending in spontaneous delivery, mean a serious sacrifice of infant life. After the method of watchful expectancy for anterior positions, we find looming large in the majority of the books, conversion of the face into a vertex, especially if the chin is lying obliquely posterior, as in right mentoposterior, or more rarely left mentoposterior, and the variations and modifications of this procedure are described in full detail. Conversion sounds so simple and logical and lends itself so readily to blackboard diagrams that I have taught it with proper zeal to successive classes for some sixteen years.

One difficulty I always encountered, however, was in citing examples to illustrate and prove its value, for the very good and sufficient reason that we had tried it but twice and both times unsuccessfully. As in other kinds of conversion, there seemed to be a lapse into the previous condition. Bumm long ago recommended version in such cases; Jellett suggests that podalic version is safest for the general practitioner (whatever he may think best for the obstetrician); von Jaschke (in von Stoeckel) and Bar seem to agree with Bumm; Smyly mentions the uncer-

tainty of success in conversion; Kerr goes farther and advises the general practitioner to let face presentations alone; Wallich even emphasizes the dangers of conversion. Whitridge Williams states that in his experience "the conversion of face into vertex presentation is rarely effectual". I wonder whether obstetricians really use conversion to any great extent or whether they are simply perpetuating a tradition.

But what have been our methods at the Woman's Medical College and have we results to justify our failure to employ this long-approved conversion?

First, we rely on "masterly inactivity and watchful waiting" when conditions in mother and child are normal, especially if the position is an anterior. If we cannot quite reach the high plane of some of the figures which I have already quoted, we can show over eighty per cent (82.6 per cent) of spontaneous births in anterior positions and over sixty per cent (61.1 per cent) in posterior positions, an average of 73.1 per cent for the entire series, or thirty out of forty-one cases. In three of these cases we helped the anterior rotation of the chin by manual manipulation during the descent.

Among the operations we have five versions: two were in anterior positions, one performed because the child was passing meconium, the other in an emergency case of a patient long in labor, with whom forces failed. One of the three versions in posterior positions was in a moderately contracted pelvis of the generally contracted type. Forceps were used three times in posterior positions, after manually rotating the chin to an obliquely anterior position under anesthesia. I hesitate to say that in one of these cases we used axis-traction forceps, because I consider the high forceps operation unfavorable for these presentations. A word of explanation is perhaps necessary. We had intended to perform version after the labor came to a standstill, but the patient refused to allow any operation until her husband could be consulted. By that time the head was, we thought, too firmly fixed for version. We have had one cesarean section in a primipara about at term, admitted to the hospital with toxemia and showing the added complications of a flat pelvis and a posterior position of the chin.

Our total number of cases is forty-one without maternal mortality and with only two cases of perineal laceration (and those of minor grade). Of the forty-one children, nine were stillborn or died shortly after birth, but these deaths are easily explained by the fact that two were macerated fetuses, five were anencephalic and the other two also monstrosities (one general edema of the fetus and the other a combination of moderate hydrocephalus, double club-foot and malformed arms). Among the remaining thirty-two normal babies there was no mortality. All were discharged in good condition and many were followed afterward for months or even for a year or two.

Now it seems to me that if a series of cases, some in a hospital, but more in the typical homes of an outpatient service in the downtown district, can give such results, we should no longer so stress the high fetal mortality of face presentations that the general practitioner is led to think a face presentation in itself a sufficient reason for stillbirths or infant deaths. Chiefs and assistants, internes and students shared in the care of these cases, and if so varied a succession of people could bring the patients through satisfactorily, surely not only the obstetrical specialist but also the average physician who does obstetrical practice should be able to help in displacing face presentations from their unenviable position as a cause of maternal and infant mortality.

DR. ANN TOMPKINS GIBSON described a **Method to Facilitate Delivery of Anencephali in Vertex or Face Presentations**, applicable to cases where shoulders are excessively developed, giving rise to severe dystocia, and where version is impossible.

CASE 1.—(West Philadelphia Hospital for Women.) Diagnosed by residents as face, through unruptured membranes. When I first saw the case it proved to be the rudimentary brain presenting, and head was at the spines and immovable. Patient was anesthetized. Grasping the fetal head with the left hand a double loop of 6 inch folded gauze (uterine packing good) was passed over the head and around the fetal neck, making certain it passed below the mastoid processes and chin. The free ends of the gauze were passed through the loop forming a slip-noose; this was drawn taut and traction downward applied. This method will permit the use of force without injury, and eventually descent of the shoulders was achieved by depressing the acromial ends of the clavicle. Child was living when delivered. Weight 9 pounds.

CASE 2. (Outpractice case, Barton Dispensary of the Women's Medical College of Pennsylvania).

Para v. Face presentation, L.M.A. Anencephalus. Descent ceased at spines. Patient anesthetized and forceps applied; could not bring presenting part to perineal floor. Uterine packing was used in the manner described and child delivered without difficulty.

CASE 3.—(Maternity Department, Hospital of the Woman's Medical College of Pennsylvania.) Para vii. Face presentation, R. M. A. When I first saw patient head was fixed at the spines and version impossible. Diagnosis of anencephalus was made.

Forceps were tentatively tried because head was so large, but failed to hold. The bandage traction method was then used and head delivered. The child was very large, and it was necessary to insert a Braun hook in the posterior axilla to deliver the shoulders, even then delivery was exceedingly difficult; the hips also were impacted.

This last case illustrates the fact that even a very large anencephalic fetus may be thus delivered, once having extracted the head, and having a means of maintaining the traction to assist delivery of the shoulders.

The anatomical peculiarities of anencephali, and the use of wide folded gauze in double length for traction, render decapitation impossible by this method.

DISCUSSION

DR. EDWARD P. DAVIS.—As regards face presentations, I have observed that the situation of the placenta has something to do with the position of the chin. If the placenta is upon the posterior wall of the uterus the tendency is for the presenting part to become anterior in its rotation; if the placenta is upon the anterior wall the tendency is for the presenting part to become posterior in its rotation and mechanism. We have had a number of face presentations, and they have mostly gone on with very little difficulty. Some have been rapidly born, others have been born after prolonged labor. Our rule is to maintain the membranes unruptured as long as possible, keep the bladder emptied by catheter and then wait. If the chin comes down well there is no reason why forceps at the side of the head should not be employed. We never use forceps without axis traction, using the Simpson. If a face presentation turns into an impacted brow it seems to me the choice is section.

In the event of anencephali and other monstrosities I should prefer cleidotomy to the violent traction, believing that crushing and firmly grasping the cranium and cleidotomy I should give the mother a better chance than by very forcible extraction.

DR. RICHARD C. NORRIS.—As Dr. Tallant read the paper, I got the impression that with this tractor considerable force was used and while efficient, the effect on the mother might not be as favorable as it would be to decrease the size of the baby. For the difficult shoulders associated with a monstrosity of this kind the child should be disregarded. It is better to diminish the size than draw a large body through the birth canal. It has been my teaching and practice to always try to determine early in face presentation if the chin is anterior. That having been accomplished I have never had any special trouble with it, but where I have found the chin posterior I have resorted to manipulation and the use of manual means to secure presentation of the occiput or at least an anterior position of the chin. Forceps to the chin anterior position is a simple procedure.

DR. DANIEL LONGAKER.—I believe that, unless conversion is attempted early, it is not a useful procedure. The crucial point in the matter of face presentations is the determination of pelvic contraction and if this exists it should certainly early be determined and forcible extraction entirely avoided. My own preference, there being ample pelvic space, would be an early podalic version.

DR. GIBSON.—In the three cases quoted, it was impossible to do version; they were impacted, and in all it was necessary to use a drastic method. I rely on this method only for extraction of the head, and then accomplish extraction of the shoulders by any suitable means indicated in a given case. In these cases we were able to extract the shoulders without any laceration of the soft parts of the mother.

DR. GEORGE W. KOSMAK, OF NEW YORK, read by invitation, a paper entitled **Fibroid Tumors Complicating Pregnancy and Their Treatment.** (For original article, see p. 63.)

DISCUSSION

DR. EDWARD P. DAVIS.—I have been greatly interested in Dr. Kosmak's paper and there can be no doubt concerning the importance of fibroids complicating gestation. At the present time the trend of professional study lies in two directions. We know the uterus by reason of its anatomical situation and anatomical structure is a fibromyomatous organ. It has been shown by a number of observers, notably by Sampson, that the uterine circulation is a series of isolated entities whereby it is possible for these growths to occur very early, readily, and that this arrangement is rendered necessary by the demand of the uterus for increased size during healthy gestation. Fibrosis of the uterus is not at all an uncommon thing in pregnancy, and in my observation it has explained some cases of slow labor in primiparous women who were married and became impregnated after the usual age of child bearing. In these no tumor was detected, and had I not had occasion to explore by section I should not have known of the fibroid condition. In two cases on whom I operated, one had a second elective cesarean section and the fibroids present at the first had practically disappeared. At the first the uterus was studded with them. There is no question that fibroid is not at all uncommon in primiparae above the usual age of child bearing.

We know that fibroids may not only grow, but they degenerate in the uterine wall and that process is followed by and may become a serious condition. The problem before the profession today in operating for any reason whatever upon nonpregnant women at the time when childbirth and child bearing may be desirable and may properly occur is what to do with the uterus that shows fibroid tumors in view of the possibilities of pregnancy; and that brings up the question of myomectomy in nonpregnant individuals in the interest of future procreation. Studies show that in nonpregnant women subjected to myomectomy 28 per cent of these women will subsequently under favorable conditions conceive. Of these women 10 per cent of them, although they may pass through the first pregnancy successfully, will have a return of the tumor and operation must be repeated in 2 per cent. That does not mean they may not be able to bear a child, but that a fibroid tumor is still there. There may be repeated the operation of myomectomy, or in some cases cesarean section or hysterectomy. From the standpoint of the conservative procedure of myomectomy in nonpregnant women these women may still have saved for them the possibility of childbirth.

We recognize certain indications in these cases as indicating surgical interference. They are first, a woman pregnant with fibroid tumor, the fibroid begins rapidly to grow sometimes with leucocytosis or fever. The second is the location of the fibroid tumor in such a part of the uterus that it is inevitable that impaction would occur when labor begins. It would be unwise not to expect trouble in a fibroid low down in the uterus. The third is the occurrence of hemorrhage, or subsequent infection, or the signs of necrobiosis, especially with bad blood count and hematin dissolved.

As regards myomectomy: each case must be studied on its merit, but I think the profession is apt to take the age of 40 as the time one must consider hysterectomy with serious view. The woman of 23 is in one class, the woman of 30 in another, the women of 40 in a third. However, the mere occurrence of a fibroid tumor *per se*, does not demand operation, for the fibroid process is so constant in the uterus that it must be more than that which draws our attention. In Dr. Kosmak's warning of watchfulness I firmly believe. He made, again, the point as to whether the fibroid penetrates the endometrium, if it does then comes danger of placental infection from vaginal infection. That is a different class from others. In myomectomy in the nonpregnant there are some operators, notably English, who prefer the incision through the anterior uterine wall no matter where the tumor may be. A strong point is made that the entire uterine cavity be explored and incision always practiced through the anterior wall. I am reminded of the remark of a recent writer of gynecology, who is conservative, who thinks that demonstrable fibroid disease in a woman pregnant or nonpregnant is a matter not to be taken lightly and that the degenerative changes with the possible implication of the blood making apparatus of the woman demand careful attention.

DR. RICHARD C. NORRIS.—It has been impressed upon me that pregnancies in women whose fibroids are multiple, submucous, or interstitial, are relatively rare. If they become pregnant they are prone to miscarry. If, at a later period, from the third month to the age of fetal viability, the tumors show signs of degenerative changes, they enter the radical surgical class. So what the average obstetrician will find in his practice from the standpoint of conservative surgery will be largely subperitoneal fibroids. We all do myomectomies in nonpregnant women very frequently. We may have a series of successful cases even in pregnancy, that may make us feel very enthusiastic and then you overreach the indication and disaster comes. In my personal experience I have had more to do surgically with fibroids gone wrong in the puerperal period than during pregnancy. I recall a case, a woman of about forty-two, pregnant, with subperitoneal fibroids, aux-

ious for a child. One of the fibroids became tender, swollen and acutely inflammatory. I sent her to the hospital and watched her. A rising leucocyte count and fever made me think at first that I must operate. She was anxious for a baby. So much impressed was I with that fact that I was not quick to operate. She went through to term and had her baby. Had I operated she would have lost her only child. Another case, three months pregnant, anxious for a child. I did a myomectomy, removed six growths and she went to term. What is the lesson to be learned? If I had a patient today relatively early in pregnancy with fibroid tumor, who had any of the symptoms of inflammatory reaction, she would be sent to the hospital. She is not safe outside. If after a few days of observation, large multiple, nodular, tumors are seriously involved, I decide the case must be operated on and it usually turns out to be a hysterectomy. Later in pregnancy, unless there are very serious and grave inflammatory reactions I believe it is wise to treat them conservatively. With fibroids in the lower segment of the uterus anticipated obstruction, cesarean section is not always necessary. There is a temptation to do it but very often the woman will deliver herself spontaneously, if the lower segment is given time enough to lift the tumor out of the pelvis. The type of case and the period of pregnancy should always influence our choice of treatment. Expectancy will be more frequently employed than surgery, as a rule.

Multinodular, intramural, or submucous tumors rapidly growing in early pregnancy will often require hysterectomy, regardless of the pregnancy. Subperitoneal growths towards the end of pregnancy we nurse along and operate when we feel we have to. It is to this class especially that myomectomy may be applied. In large multinodular obstructing tumors at term, do cesarean section and hysterectomy and give her her baby. We watch in the puerperal period the involuting fibroid and at the first sign of things going wrong prompt operation is indicated. I recall a case with an inflamed ovarian cyst, a Catholic, anxious for a child, I operated on her and removed the ovarian cyst. At the time of operation we found also several fibroids, one of them undergoing necrosis. I felt a hysterectomy was necessary but was not allowed to proceed. The woman miscarried and went through a stormy convalescence and five fibroids sloughed out of her abdominal incision. She recovered. You say Nature will take care of them. She won't take care of all of them. We should be more prompt to operate on fibroids complicating pregnancy. That is my final agreement with Dr. Kosmak.

DR. ELLICE McDONALD.—I think fibroid in pregnancy should be considered in the light of what fibroid does to pregnancy and then what pregnancy does to the fibroid. I am sure that a great number of cases go through pregnancy without very much trouble for the reason that fibroids are not commonly recognized in pregnancy. I had that experience a number of years ago in our clinic where very few fibroids were reported and I invited the men on the staff to examine very carefully and so we ran through a series of 2600 cases and we found about four times as many fibroids as had been reported previously. In all there were 0.5 per cent. In that series there were only two cases which complicated pregnancy in the sense of fibroid complicating pregnancy by obstructing labor. There were four cases where placenta was retained, a number of forceps operations, not very much over the average, and in no case was there any necrosis of the fibroid, although there was an unwonted number of postpartum hemorrhage. I agree entirely with what Dr. Norris has said in regard to radical treatment of fibroid and that they should be very carefully watched, but I do think that fibroid is getting a hard name in regard to pregnancy because they are not as frequently looked for, not overlooked, but not looked for, so that the actual percentage of trouble, I think, is magnified because we hardly know the total number of cases. There is no doubt that pregnancy sometimes has a very evil effect upon fibroids. It is interesting to try to prog-

nosticate beforehand as to what fibroids will undergo decrease in size. It seems to be chiefly fibroids involved in the uterine wall. A type of what we would call sessile in nonpregnant uterus. Those that have pedicle do not seem to undergo a marked change. I agree with Dr. Norris and with Dr. Kosmak that they need to be very carefully watched.

DR. COLLIN FOULKROD.—I want to add the experience of a limited number of cases and a growing number of fibroids in these cases, to what Dr. McDonald has just said. It has been in my mind during the past two or three years, that we must not condemn fibroids too freely. The fact remains that so many of them go their way for years unrecognized that we are unable to tell the percentage of fibroid in normal labor cases which do not give us trouble. It does not seem to be the situation in the uterine body, whether low or high, but rather in the uterine wall that causes trouble. There are two points I want to call attention to, one hinted at, the diagnosis of appendicitis during pregnancy. I had two patients who came with acute pain and on opening up I found an incarcerated fibroid which I lifted out of the pelvis and allowed the patient to go to term, then did a section with hysterectomy. She made a good recovery. In the second case an appendix was removed and the incarcerated fibroid elevated from the pelvis, this woman delivered herself and is at term with a second child with a fibroid uterus. A third point to remember is that myomectomy sometimes offers obstruction to the possibility of hysterectomy in cesarean section for fibroid. A case in point: a surgeon removed a number of fibroids from the wall of the uterus in a patient in her third pregnant if nothing else intervenes. One other complication to which I did not refer, Because of bleeding and attempts to misearry, the patient was kept in bed almost the entire nine months. At term the baby was found sitting on a large fibroid in the lower segment of the uterus, the feet extended to the cervix and the vagina, a large ovarian cyst the size of a grape fruit outside of the tumor. This situation precluded a vaginal delivery. It was with the greatest difficulty that we found room to do a cesarean section between the omental adhesions at site of former myomectomies. The placenta was very tightly adherent over the fibroid and excessive hemorrhage followed its manual removal.

DR. KOSMAK (closing).—Dr. Davis and Dr. Norris referred to the question of myomectomy in young women: with the advent of radium we find that a great many women are getting so-called prophylactic doses of radium to stop bleeding and my own experience with a number of these cases has made me extremely careful, because I find that some of these young women, who undoubtedly bled from fibroids of the uterus, which can in some cases be palpated, do not require large doses of radium to stop menstruation altogether and in fact to sterilize them. It seems to me that in a choice of operation and removal of a fibroid tumor and the application of radium, I would prefer the laparotomy with myomectomy rather than the indiscriminate use of radium. Undoubtedly the presence of these fibroid tumors contributes to sterility and, if possible, every woman should be given a chance. I operated on a girl only a few weeks ago who presented a tumor as large as a coconut, she was less than 30 years of age, and very desirous of being married. She did not want to enter the marriage state in a condition that probably would not be satisfactory to her husband. That woman's uterus I think is in a very good condition for a possible pregnancy. The fibroid could be removed without disturbing the entrance to the tubes and I have no doubt but that she can become pregnant if nothing else intervenes. One other complication to which I did not refer, is the possibility of uterine rupture. A woman was recently brought to the Lying In Hospital with a history of placenta previa. She had been in labor several hours which then suddenly stopped. I did not get this history from the woman

as she could not speak English, but the husband told us of it later. Examination showed a mass presenting in the cervix which was soft, about as long as the hand and felt like a projecting placenta. The cervix seemed to be fully dilated, the head was above the brim and I did a rapid version and breech extraction. After I got the baby out I found that what I had supposed was a fully dilated cervix was a rupture which extended out through the lower uterine segment into the abdominal cavity and the intestine was hanging down into the same. The mass which I thought was a placenta was a fibroid in the lower uterine segment which was sticking down into the ruptured cervix. I have no doubt from the history of the case and the denial from the doctor in attendance that he had done anything, that this woman had a spontaneous rupture of a fibroid uterus. It is possible and probable that some of these cases of spontaneous rupture of the uterus may be due to this cause.

DR. ELLICE McDONALD read a paper entitled **Processes of Tubal Pregnancy.** (For original article see page 72.)

DISCUSSION

DR. EDWARD A. SCHUMANN.—Except in a few instances, I am entirely in accord with this presentation, but I do hold it to be a little bit confused as to just why so much stress was laid upon the first accident of extravasation into the tubal wall. If my recollection is correct, I think Veit called attention to this in 1897. I was so taught as an undergraduate and indeed I can hardly recall any careful pathologic study of the subject that has not discussed intramural extravasation. It has usually been termed "hemorrhage, with death of ovum." In Williams' Textbook there is a passage in which Dr. McDonald's words are almost paraphrased. In regard to the scar, I do not believe Dr. McDonald will often find it. If you will remember the process of embedding of the ovum in the uterus where you have decidua, the ovum after it enters the uterus begins to seek for a blood supply and the endometrium is literally eaten away, the great folds of endometrium covering up the cavity and there is no scar. Precisely the same thing holds true in the tube, the ovum embedded, begins to digest its way into the structures of the tube. Dr. McDonald also said this type of so-called tubal abortion was neither tubal pregnancy nor abortion. It is tubal pregnancy because it is bounded by the serous surface of the tubes and anything within the serous surface is tubal. As to separation of muscle fibers and final escape of the ovum by fimbrial rupture, that is an accident which does take place occasionally. It is much simpler for a tubal ovum by protoplasmic activity or mere pressure to get back into the already partially eroded mucosa than to dissect out of all these muscle bundles. I believe, however, that in a large number of tubal abortions, the entire ovum surrounded by blood clot, may be found in the lumen of the tube and I have two specimens in which the ovum is partly extruded from the tube and in which careful serial sections demonstrated that the fimbriae were not injured at all.

DR. EDWARD P. DAVIS.—Two clinical points: does not the absorption of the proteolytic ferment in tubal and rupturing pregnancy predispose to shock? Is not that one of the causes of shock out of proportion to hemorrhage? Second, the character of the pain as the muscular layers of tube rupture, is important clinically. I recall a case which went to a fatal termination through shock, where operation disclosed a minimum hemorrhage and where two distinct accessions of pain could be traced to successive rupture of muscular layers of the tube. I do not think that

we should get the idea that rupture of tubal pregnancy comes with great suddenness, as a *tour de force*. The gradual pain, with increasing shock, seems to me to be the essential clinical picture.

DR. McDONALD (closing).—There is no doubt, as Dr. Davis says, that ectopic rupture is not a sudden process, as a rule. As regards the shock from proteolytic ferment, I do not know the amount of the ferment, but it is probably very small. In ectopic pregnancy the degree of shock is sometimes rather diverse from the amount of blood lost. The question of hemorrhage between the coats has not been described except by Bonney, although hemorrhage into sinuses of the gestation itself has been long recognized, but the fact of intramural extravasation of blood between the coats has never been referred to, except by Bonney. Hemorrhage from the nourishing blood lake itself has been recognized but not dissecting hemorrhage between the coats. At least I am unfamiliar with it. I have never seen the gestation begin in the lumen of the tube itself. As described by Dr. Schumann, this covering up by the mucosa occurs in the uterus, but never has been described by any one as occurring in the tube. I have seen one scar and it is very difficult to find even in tube where the ovum has passed. I have suggested an alteration of the nomenclature, not with a view of upsetting any old nomenclature, but with the idea of correlating symptoms and pathology more exactly. The first accident of tubal pregnancy, intramural extravasation of blood between the muscular coats of the tube wall, should have some expression in the terminology. The old terms of tubal abortion and tubal rupture are inexact and misleading as to the pathology. Fimbrial rupture, is a better term than tubal abortion, because that implies that rupture comes from the mucosal canal. No doubt in many cases it does not. Transperitoneal rupture is what Bonney calls extratubal rupture under the old terminology, tubal rupture which is not truly tubal as it only bursts through the outer coat of the tube.

NEW YORK ACADEMY OF MEDICINE
SECTION ON OBSTETRICS AND GYNECOLOGY
STATED MEETING, FEBRUARY 27, 1923.

DR. WILLIAM E. CALDWELL IN THE CHAIR

DR. LYNN LYLE FULKERSON presented a **New Cystoscope for Female Bladder and Urethra.**

This instrument is a direct vision cystoscope designed to permit examination of the female bladder and urethra by either air or water distention. It consists of four tubes of sizes 24, 27, 30, and 33 F any one of which may be adjusted to a universal light-carrier. (Fig. 1.) The tubes are 10 cm. in length and each is furnished with an obturator. The light-carrier is provided with a lock-screw for holding the tube in place, with a tube and cut-off for regulating the filling of the bladder and urethra with water, with a small opening for air escapement, and with a light-carrier base which sets into a slit-tube at the end of a nickel cord terminal. (Fig. 2.) The cord terminal serves as a handle and is provided with a switch for controlling the light. Four eyepieces are furnished, one of which is without a lens, being left open for use when operating. The other three eyepieces are closed by lenses. They are locked on the light-carrier before filling is begun. When the eyepieces are partly locked a hole is left open for air escapement; when completely locked

it is closed. The lens marked "1" produces a magnification of about twice the actual size. It has a focal length permitting clear vision for $1\frac{1}{2}$ inch in front of the tubes in water. It is used in examination of the urethra by water dilatation only. Lens "2" has a focal length of about $\frac{1}{2}$ inch beyond the proximal end of the instrument in air and about two inches in water. It is used in examination of the bladder by water dilatation. The magnification is about $1\frac{1}{2}$. Lens "3" is plane glass and is advised for routine cystoscopy and urethroscopy by water dilatation. A double catheterizing eyepiece is furnished with the instrument if especially ordered. It consists of two tubes set in metal with a window above and permits the passage of number 5 and number 6 catheters. A similar eyepiece allowing the use of waxed bougies to size 12 F is also manufactured.

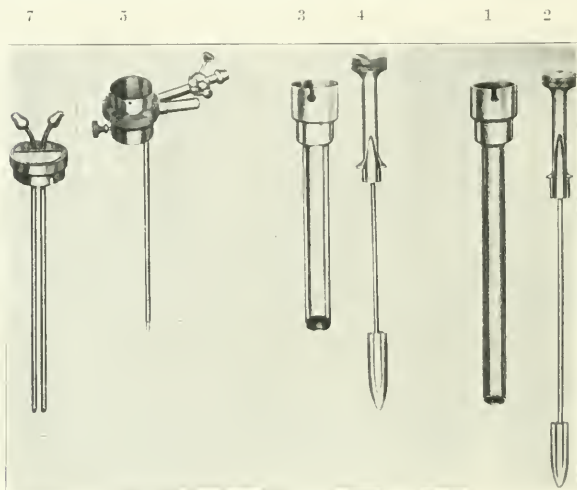
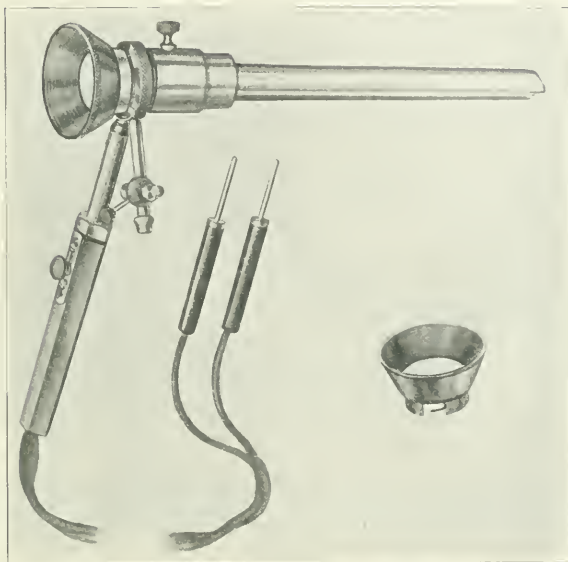


Fig. 1.

1. Cystoscopic Tube. 2. Obturator for passing cystoscopic tube. 3. Seven cm. tube for urethra. 4. Obturator for passing urethroscopic tube. 5. Light-carrier with lock-screw, light-carrier base, tube and cut-off for filling, also opening for air escape (Fig. 2). 6. Examining eyepiece. 7. Double catheterizing eyepiece. Perforated rubber caps are used to prevent leakage. 8. Eyepiece for operating with water dilatation of the bladder. A large perforated rubber cap is used to prevent leakage around the bougie (Fig. 3). 9. (Fig. 2) Instrument assembled for use as a direct vision cystoscope or urethroscopy. The cord-handle is attached.

From this description it is evident that the instrument is in reality an adaptation of the Kelly endoscope to permit the diagnosis of urethral and bladder conditions or ureteral catheterization, of fulguration by water dilatation and still leave in the hands of the operator as endoscope like the Kelly with which to make applications to the urethra or carry out operative procedures by means of air distention. Although the cystoscope may be used satisfactorily in the examination of both bladder and urethra, short tubes 7 cm. in length are provided for the operator who prefers a closer view and greater ease in diagnosing and treating diseases of the female urethra. This shortened instrument is called the urethroscope. The open eyepiece or No. 1 or No. 3, is used with the urethroscope.

9



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Fig. 2.

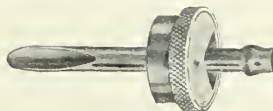


Fig. 3.

DR. WALTER TAYLOR DANNREUTHER read a paper entitled **Dextroversion of the Uterus, with Congenital Absence of Left Fallopian Tube, Ovary, Broad Ligament, Round Ligament, Kidney and Ureter.** (See page 51.)

DR. HERMAN SHARLIT read a paper entitled **Desiccated Ovary; Its Use, Preparation, and a Suggestion as to the Method of Standardization.** (See page 33.)

DISCUSSION

PROFESSOR RALPH H. MCKEE: This dehydration work started as a war problem in order to find a method of dehydrating meat so that it could be exposed to the air for six months or more and then by restoring the water would be like

fresh meat. After succeeding in doing this in the laboratory it was done on a larger scale. The apparatus used is a slightly modified vacuum shelf drier. The essential phases as employed in the dehydration of meat have been applied to the preparation of glands. The temperature of the steam employed for heating the shelves, at the start is 73° C. and then 60° C. later on. The material is of course cooler, due to evaporation. The time required is about eight hours, but varies a little according to the thickness of the glands. The ovarian glands I have brought are now blood-red and essentially dry, though for complete dryness they need a little longer time. They will become a little darker brown on exposure to air, even then if soaked in water they will exude blood. If kept for six months they would still show some blood and the characteristics similar to those of the fresh product. The dessication must be done quickly and that means a good vacuum as well as the correct temperature and there must be no oxidation.

DR. WALTER T. DANNREUTHER.—While I am not qualified to discuss the various technical methods by which glandular extracts are prepared, there are two or three matters having to do with the clinical aspect of organotherapy, referred to by Dr. Sharlit, upon which I should like to comment. Very frequently endocrine therapy is condemned for no better reasons than those that the doctor has mentioned. It seems to me, however, that there is little excuse for anyone erroneously attributing a pruritis to the menopause in the presence of a diabetes mellitus, just because the patient happens to be in her climacteric period, and expecting that it will be relieved by the administration of ovarian extract, or any other extract. Permit me to suggest four reasons for unjust censure of organotherapy. First, suitable cases are not always properly selected. Second, a detailed history and careful observation of the patient's general physical characteristics, based upon a knowledge of the normal physiological manifestations of the activity of the several ductless glands, is essential. I defy any man seeing ten to thirty patients in his office in an hour to analyze his histories correctly and apply organotherapy intelligently. Third, many of the organic extracts, including ovarian, have not yet been standardized, such as pituitary. Fourth, many who write and talk on disturbances of the internal secretions are not sufficiently careful to discriminate between accepted facts and pure theories.

The importance of recognizing more or less reciprocal activity between all the glands of internal secretion should be emphasized. In the case of hot flushes and the regression of ovarian function, Dr. Sharlit has selected one of the few examples of a symptom which may be properly attributed to the dysfunction of a solitary gland. But the ovary is not the only gland responsible for menstruation; the thyroid and ovary also promote it. In most instances we find that there is a disturbance of more than one gland, and that therapy will fail if one extract alone is relied upon.

I think that the vertigo and nausea, which disappeared when Dr. Sharlit reduced the dose of ovarian extract, would have ceased after two or three days had he not done so. It has been my experience that these symptoms gradually lessen spontaneously as toleration is established, and it is unnecessary to reduce the dosage below five grains.

DR. J. J. McNULTY.—I think the trouble is that physicians try to be organotherapists while they fail to be biologists. No one can be an organotherapist who is not primarily a biologist. The interrelation between organotherapy and biology is not merely a correlation but a unified phenomenon. No one can appreciate organotherapy fully or practice it effectively unless he recognizes this unity, which is not an interrelationship but a splendid and extraordinary harmonizing system.

working with intelligent cooperation. When men spend their time differentiating the phenomena of disturbances of a single gland, they are symptomatic therapeutists, and are without biological sense, and they are not even organotherapeutists. Dr. John J. Abel pointed out that fact when he proved that a single compound like epinephrin supposed to contain a single principle is not a single principle, and showed that the action of such a principle may be entirely different in two different cases owing to the difference in the functional activity of the glands in the different individuals. It depends upon the receptivity of the subject, for epinephrin has two radicals, one positive and one negative, one causing vasodilatation and the other causing vasoconstriction. This shows that these things to which we are trying to give definitions are compound substances; we cannot make a definition, for there is no single definition which fits any one of them.

DR. SHARLIT (closing).—I made no effort to make an endocrinologic study. I was interested in finding a therapeutic principle in ovarian extracts and hit upon a symptom which was most regularly present in disturbances of the ovary. This substance relieves this symptom and I think it is one definite therapeutic principle. In studying the endocrines we must look upon the interrelationship and correlation of all the glands, but I was not concerned with that. The suggestion that I was trying to study the ovary as a distinct endocrine entity does me an injustice, for I did not attempt any endocrinological study at all.

DR. JAMES A. CORSCADEN read a paper entitled **Limitations of Radiotherapy in the Management of Fibromyoma of the Uterus.** (See page 42.)

DISCUSSION

DR. LEON T. LE WALD.—The statement has been made that stimulation sometimes occurs with underdosage of x-rays. I should like to know what Dr. Corscaden's experience has been along that line. I believe Dr. James Ewing has stated that he has never seen any proof of stimulation of a new growth by means of radiation.

DR. CORSCADEN.—The question of underdosage with x-rays and radium is one of the utmost importance. This is the only cause of unfavorable result in the patients who have been treated by others and have later come to me. They have been given 600 or 700 milligram hours of radium on the theory that they would modify menstruation without destroying the function. Some have succeeded in regulating menstruation but the patients still have their myomata. They require frequent examinations and are mentally upset. The principle which we have adopted as applicable to women with myomata of the uterus is that small doses of radium will cause more discomfort and will in the end cause a greater loss of time to the patient than if she submits to an abdominal operation. The dosage should be large enough to produce permanent amenorrhea.

DR. HAROLD CAPRON BAILEY, and HALSEY J. BAGG read a paper entitled **The Effect of Radiation on Fetal Development.** (See page 461, May issue.)

DISCUSSION

DR. HALSEY J. BAGG.—I have been interested in this subject, mainly from the biological point of view. Many physical and chemical agents may bring about

morphological changes in offspring treated during their early development. Radiation, heat, cold and chemicals may all bring about arrested development. It would seem that a certain part of the body may be slowed up in its development by a critical period, and that particular part never has the opportunity to catch up with the rest of the organism. Abnormal structure results from such arrested development.

I should like to refer to some biological work of Professor Guyer which may be of interest. He took rabbits' lenses, made an emulsion and injected it into a fowl, and then the serum from the fowl's blood was injected into pregnant rabbits and the young of these rabbits showed eye defects. There are apparently data to show that the abnormalities are inherited. I do not want you to think that the biologists are going back to the idea that acquired characteristics are inherited; I should rather have you take Dr. Corseaden's illustration of the four electrons, where one electron was eliminated from the system, for I think something analogous to that may happen to the germ plasma after exposure to irradiation.

DR. DAVID TOVEY.—I should like to ask Dr. Bailey whether he means that a pregnant woman should not be x-rayed to see whether the pelvis is normal. If an ovary were removed before the fourth month of pregnancy abortion will result, but if the ovary is removed later it does not occur. Will it injure the fetus to make roentgenograms of the pelvis to define the different positions of the fetus?

DR. L. T. LE WARD.—I should like to help answer that question. In something like 200,000 x-ray exposures for diagnostic purposes there has been a certain percentage of pregnant women in various periods of gestation in whom the examination was made for some complicating condition as a pyelitis, stone in the kidney, chronic appendicitis, or to ascertain whether a nausea was due to an associated gastric or duodenal ulcer, or to differentiate between an ovarian cyst and pregnancy. Most of these examinations were made after the fourth month. In all these cases that I have followed to term and afterward there has been no injury to the child from a properly conducted diagnostic procedure. I have no hesitation in saying that it is perfectly safe to make such an examination provided some rational amount of dosage is kept in mind.

DR. ISAAC LEVIN.—I shall not discuss the paper from the standpoint of gynecology but of the general aspects of radiology and radiotherapeutics. A great deal has been written recently on the subject of roentgenography of the pregnant uterus in order to ascertain the diameter of the pelvis. I consider it a rather hazardous undertaking.

The lymphoid tissue, the leucocytes of the blood and the thymus are extremely radiosensitive and very easily injured by comparatively small quantity of radiations. The deleterious effects of irradiation of these organs and tissues may appear only several years later and bring about an arrest in the development of the organism of the child who was irradiated in its fetal life.

Irradiation of a young or pregnant woman should be done with a great deal of care and only when a serious need for it exists. While it is true that roentgenology is of enormous help in diagnosis and in therapy, it must not be forgotten that the x-rays represent a powerful agent which may influence the whole organism.

DR. CALDWELL.—To determine whether such use of the x-rays is harmful there will have to be a long follow-up, well-conducted, of a large number of cases in which the x-rays have been used in these small doses, before it can be

proved that the diagnostic use of x-rays is dangerous. I do not imagine that Dr. Bailey and Dr. Bagg intended to bar the diagnostic use of x-rays and radiation.

DR. BAILEY, (closing).—We rather felt that the discussion would be along the lines of x-ray and radium treatment of fibroids and menorrhagia in women of the childbearing age. We believe that our warning is justified in looking over this material. We feel that these women, if radiated at all, should be radiated to complete sterility.

As regards gathering a large number of cases, of course that cannot be done in an ordinary length of time. We are now reporting the results in 3,000 cases from the literature treated for menorrhagia and fibroids, with something like 35 or 40 cases of pregnancy. If it has taken all this time to gather this small number, and some 50 per cent of these children have failed to live beyond the early period of infancy, it is futile to attempt to irradiate with the idea of having conception follow at some future time.

In regard to making x-ray examinations to find the measurements of the pelvis, we have quoted Horner's paper. He states that he has given x-rays to a total of 3000 milliamperes seconds, and we think that such an amount is unjustifiable. If x-ray examination is necessary it should not be made in the early part of pregnancy. As to the thymus, we agree with Dr. Levin. We all know of infants showing pressure symptoms from an enlarged thymus that are relieved after x-ray treatment. We know also that this is true in regard to lymphoma and other like conditions. If x-rays are used in order to measure the pelvis the results may not be evident at the time of the birth of the child but they may manifest themselves later. Dr. Le Wald says he does not hesitate to make an x-ray examination on a pregnant woman, but Dr. Hirsch, at Bellevue, refuses to make such an examination, except in occasional instances. I have tried to persuade him to make a second examination in a woman who had had a cesarean section and he refused, so there are certain radiologists who feel there is harm in it, and with them we are in agreement.

Department of Reviews and Abstracts

CONDUCTED BY HUGO EHRENFEST, M.D., ASSOCIATE EDITOR

Collective Review

Views of Primitive Peoples Concerning the Care of Cord and Placenta

BY JONATHAN WRIGHT, M.D., PLEASANTVILLE, N. Y.

THE interest of the obstetricians in the primitive treatment of the umbilical cord at birth is not to be thought of as negligible, but it is secondary to the extraordinary ethnological interest which attaches to the vast mass of magical belief and practice revealed by the investigations of observers of modern primitive man in every corner of the world.

The treatment of the navel-string does not essentially differ at child-birth among primitive women from our own practice. In the Andaman Islands⁸⁹ the umbilical cord was severed by means of a Cyrena shell though now a steel blade is often used. Among the Sinaugolo "one of the mother's friends cuts the cord, which is neither tied nor twisted, with a bamboo knife at the length of the child's thigh from the abdomen."⁹⁰ The Shuswap⁹¹ Indians of British North America cut the navel string with an ordinary sharp knife. In former days midwives used their arrow stone knives for this purpose. The navel-string was tied with a soft thread of Indian-hemp bark. By the Central Esquimaux "the afterbirth is placed deep in a crack between rocks, where the dogs cannot touch it. The navel-string is tied with plaited wing-sinews of a sea-gull, and the down of grass-seeds is put underneath. Then the navel-string is put over the nail of the thumb and cut with a sharp edged stone. Generally it falls off after five days."⁹² In South Africa, "the umbilical cord it tied near the navel and cut about three inches from it."⁹³ In North East Asia the Chukchee mother "ties up the navel with a string of sinew into which a few of her own hairs have been plaited. This string, of course, has been prepared beforehand and kept ready. She cuts the navel with a sharp stone which will serve her for that purpose during her whole life. The stone is simply taken from one of the skin-scrapers, and ever after that is kept in the clothes bag of the woman. The navel is left unwrapped, but is kept rubbed all the time with dry powdered coal, till at last it falls off."⁹⁴ In Northern India, the umbilical cord is cut by a blunt instrument such as a sickle which Crooke⁹⁵ thinks is responsible for the prevalence of infantile lockjaw among the infants. The jawbone and the umbilical cord of a previous King of the Baganda⁹⁶ in Africa play prominent parts in many of the royal ceremonies and the umbilical cord plays also an important rôle at the ceremony of christening or rather the naming of the child itself. In

Australia "when a man has a child born to him he preserves its umbilical cord by tying it up in the middle of a bunch of feathers. This is called a 'kalduke,'"⁹⁷ and is used in establishing some sort of a relationship or taboo with the children of the man, to whom it is given, in another tribe, which accomplishes something in the way of conferring superiority in the face of collusion between those hostile to the participants in the ceremony and the taboo. The ancient Peruvians,⁹⁸ when they cut the navel-string, at the birth of the child, left it as long as a finger, and when it fell off they preserved it with the greatest care and gave it to the child to suck when it felt ill.

It must be borne in mind that primitive man has always held tenaciously to the view that the possession by one individual of anything, belonging to or having belonged to another man, gives the one in possession an opportunity to exercise certain influences, for good or evil as he chooses, over the original owner. It may be his hunting knife or his bow, but vastly more important are his shorn hair and his nail parings. Rightly manipulated, these place in the hands of the wise, the wizard, the medicine man, all but absolute power over his life and death. The possession by another of anything so vitally important as the secundines cannot be contemplated for a moment with equanimity by any primitive mother and the question for the child, whom they enveloped and ministered to in utero, remains often in remote years a matter of extreme concern.

From the multitude of ceremonies and observances which are reported as to the placenta, it is apparent, and indeed we should naturally expect, that the function of the afterbirth is unknown, at least in any fixed and definite way, to primitive man. Therefore it is not remarkable that numerous theories should have sprung up among primitive men as to its significance. The enormous number and diversity of the ideas on the subject, the conclusions drawn from the phenomenon, as noted by Frazer⁹⁹ are compliments to the mental vigor of the human race. To make quotation at random, at the risk of repetition: After referring to the hair and nails we often hear of in the practices of negro witchcraft and deciduous teeth at great length he says: "Other parts which are commonly believed to remain in sympathetic union with the body, after the physical connection has been severed, are the navel-string and the afterbirth, including the placenta. So intimate indeed is the union considered to be, that the fortunes of the individual throughout life are often supposed to be bound up with one or other of these portions of his person, so that if his navel-string or afterbirth is preserved and properly treated he will be prosperous; whereas if it be injured or lost he will suffer accordingly."..... "In Pasir, a district of eastern Borneo, the afterbirth is carefully treated and kept in an earthen pot or basket in the house until the remains of the navel-string have fallen off. All the time it is in the house candles are burned and a little food is placed beside the pot. When the navel-string has fallen off, it is placed with the placenta in the pot, and the two are buried in the ground near the house. The reason the people take this care of the afterbirth is that they believe it able to cause all kinds of sickness and mishaps. The Malas, a low Talugu caste of Southern India, bury the placenta in a pot with leaves in some convenient place, generally in the back yard, lest dogs or other animals should carry it off, for if that were to happen they fancy

that the child would be of a wandering disposition. The Khasis of Assam keep the placenta in a pot in the house until the child has been formally named. When that ceremony is over, the father waves the pot containing the placenta thrice over the child's head, and then hangs it to a tree outside of the village. In some Malayo-Siamese families of the Patani States it is customary to bury the afterbirth under a banana tree, the condition of which is thenceforth regarded as ominous of the child's fate for good or ill. A Chinese medical work prescribes that 'the placenta should be stored away in a felicitous spot under the salutary influences of the sky or the moon, deep in the ground, and with earth piled up over it carefully, in order that the child may be ensured a long life. If it is devoured by a swine or dog, the child loses its intellect; if insects or ants eat it, the child becomes scrofulous; if crows or magpies swallow it, the child will have an abrupt or violent death; if it is cast into the fire, the child incurs running sores.' The Japanese preserve the navel-string most carefully and bury it with the dead in the grave. Among the Gallas of East Africa the navel-string is carefully kept, sewn up in leather, and serves as an amulet for female camels, which then become the child's property, together with all the young they give birth to. The Baganda believe that every person is born with a double, and this double they identify with the afterbirth, which they regard as a second child. Further, they think that the after-birth has a ghost, and that the ghost is in that portion of the navel-string which remains attached to the child after birth. This ghost must be preserved if the child is to be healthy. Hence when the navel-string drops off, it is rubbed with butter, swathed in bark-cloth, and kept through life under the name of 'the twin' (*mulongo*). The afterbirth is wrapped up in plantain leaves and buried by the child's mother at the root of a plantain tree, where it is protected against wild beasts. If the child be a boy, the tree chosen is of the kind whose fruit is made into beer; if the child be a girl, the tree is of the kind whose fruit is eaten. The plantain tree at whose root the afterbirth is buried becomes sacred until the fruit has ripened and been used. Only the father's mother may come near it and dig about it; all other people are kept from it by a rope of plantain fibre which is tied from tree to tree in a circle round about the sacred plantain."..... "Such are the customs observed with regard to the afterbirth and navel string of Baganda commoners. The king's navel-string or 'twin,' wrapped in bark clothes and decorated with beads is treated like a person and confided to the care of the Kimbugwe, the second officer of the country, who has a special house built for it within his enclosure. Every month when the new moon first appears in the sky the Kimbugwe carries the bundle containing the 'twin' in procession, with fife and drum playing, to the king, while the royal drum is beating in the royal enclosure."

The supernatural aspect of the placenta finds expression in many beliefs widespread throughout the primitive races of mankind and by no means extinct among civilized men. He who is born with a caul is supposed to have certain chances in the game of life, not possessed by others. This is a belief at which we smile, perhaps, but whose very persistence significant of a past when the smile did not betray itself. "Thus in many parts of the world the navel-string, or more commonly the afterbirth, is regarded as a living being, the brother or sister of the infant, or as the material object in which the guardian

spirit of the child or part of its soul resides. This latter belief we have found among the aborigines of Queensland, the Battas of Sumatra, and the Norsemen of Iceland. In accordance with such beliefs it has been customary to preserve these parts of the body, at least for a time, with the utmost care, lest the character, the fate, or even the life of the person to whom they belong should be endangered by their injury or loss. Further, the sympathetic connection supposed to exist between a person and his afterbirth or navel-string comes out very clearly in the widespread custom of treating the afterbirth or navel-string in ways which are supposed to influence for life the character and career of the person, making him, if it is a man, a swift runner, a nimble climber, a strong swimmer, a skilful hunter, or a brave soldier, and making her, if it is a woman, an expert fisher, a cunning sempstress, a good cook or baker, and so forth. Thus the beliefs and usages concerned with the afterbirth or placenta, and to a less extent with the navel-string, present a remarkable parallel to the widespread doctrine of the transferable or external soul and the customs founded on it. Hence it is hardly rash to conjecture that the resemblance is no mere chance coincidence, but that in the afterbirth or placenta we have a physical basis (not necessarily the only one) for the theory and practice of the external soul."

Major Gurdon¹⁰⁰ comments on some of this as follows. "Dr. Frazer when dealing with the subject of sympathetic magic, refers to the navel-string and the placenta as parts which are commonly believed amongst certain people to remain in sympathetic union with the body after the physical connection has been severed, and it is interesting to note that in the Babar Archipelago, between New Guinea and Celebes, the placenta is mixed with ashes and put in a small basket, which seven women, each of them armed with a sword, hang up on a tree of a peculiar kind (*citrus hystrix*). The women carry the swords for the purpose of frightening the evil spirits, otherwise the latter might get hold of the placenta and make the child sick. Mr. C. M. Pleyte, Lecturer on Indonesian Ethnology, at the Gymnasium William III at Batavia, who has most courteously furnished me with some interesting information on this subject, states that it is especially in the Southern Moluccas that the placenta is mixed with ashes and hung in a tree. Wider spread is the custom of placing the afterbirth on a small bamboo raft in a river 'in order that it may be caught by crocodiles, incarnations of the ancestors, who will guard it till the person to whom it has belonged dies. Then the soul of the placenta is once more united with that of the dead man, and together they go to the realms of the dead. During lifetime the connection between men and their placentas is never withdrawn.' The Khasis, although they cannot explain the meaning of the presence of the placenta at the naming ceremony, and the care with which they remove it and hang it up in a tree, are probably really actuated by the same sentiments as the inhabitants of the Southern Moluccas, i.e., they believe that there is, as Dr. Frazer puts it, a sympathetic union with the body after the physical connection with the child has been severed. There is no fixed period of song, or taboo, after a birth, but the parents of the child are prohibited by custom from crossing a stream or washing their clothes until the navel-string falls off, for fear that the child should be attacked by the demons of the hills and the vales."

BIBLIOGRAPHY

- (89) *Man, Edward Horace*: On the Aboriginal Inhabitants of the Andaman Islands. London: Anthropological Institute of Great Britain and Ireland, 1883.
- (90) *Seligmann, C. G.*: The Medicine, Surgery and Midwifery of the Sinaugdo. Anthropological Institute of Great Britain and Ireland. Journal, xxxii 1902, p. 297.
- (91) *Teit, James*: The Shuswap. Leyden and New York, 1909. American Museum of Natural History, Mem. Jesup North Pacific Expedition, ii, pt. 7.
- (92) *Boas, Franz*: The Eskimo of Baffin Land and Hudson Bay. American Museum of Natural History, Bulletin, xv, pt. 1, New York, 1901.
- (93) *Junod, Henri A.*: The Life of a South African Tribe. London: D. Nutt, 1912-13. 2v. Vol. 1. The Social Life. Vol. 2. The Psychical Life.
- (94) *Bogaras, Waldemar*: The Chukchee. Leiden, 1904-09. 3 pts. Amer. Museum of Nat. Hist. Mem. Jesup North Pacific Expedition. Publications. Vol. 7, pt. 1-3.
- (95) *Crooke, William*: The Popular Religion and Folk-Lore of Northern India. New ed. Westminster, Eng. A. Constable & Co., 1896. 2v.
- (96) *Roscoe, John*: The Bagauda. London: Macmillan & Co., Ltd., 1911.
- (97) *Taplin, George*: The Narrinyeri. In The Native Tribes of South Australia. Adelaide, 1879, p. 1.
- (98) *Vega, Garcilasso de la, el Inca*: First Part of the Royal Commentaries of the Yncas. Tr. and ed. by Clements R. Markham. London: Hakluyt Soc., 1869-71. 2v. (Hakluyt Soc. v. 41, 45).
- (99) *Frazer, J. G.*: The Magic Art. 3d ed. London: Macmillan & Co. Ltd., 1913. 2v.
- (100) *Gurdon, P. R. T.*: The Khasis. Published under the orders of the Government of Eastern Bengal and Assam. London: D. Nutt, 1907.

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Original Communications

THE OLSHAUSEN OPERATION FOR SUSPENSION OF THE UTERUS*

BY WILLIAM P. GRAVES, M.D., BOSTON, MASS.

IN APPROACHING the complicated problems of reconstructive surgery in gynecology it is desirable to reduce them if possible to the simplest terms. Thus if one were to ask what are the primary requirements to be met, the answer would be somewhat as follows. First, there are certain well-defined symptoms for which the patient seeks relief, and which she expects the surgeon to cure. Secondly, there exist as causes for these symptoms certain anatomic abnormalities which the surgeon must study in their specific relationship to the symptomatology. Thirdly, certain mechanical means must be devised by which not only will the tissue defects be anatomically repaired, but the patient's symptoms at the same time be thereby relieved.

We shall discuss the subject according to these three headings with special reference to the technical problems involved in the last.

SYMPTOMATOLOGY

A typical case requiring reconstructive surgery presents a complex of symptoms of which the more familiar are backache, pains in the loins, pelvic pains on one or both sides, digestive disturbances, nervous symptoms of all kinds, consciousness of the extrusion of parts through the introitus, functional incontinence of urine, leucorrheal discharge, etc., etc., and finally pelvic pressure with a resulting sense of weakness and general incapacity. Some patients present all these

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NOTE: The Editor accepts no responsibility for the views and statements of authors as published in their "Original Communications."

symptoms and many more besides. Some complain perhaps of only one or two, and in rare instances even of marked relaxation, subjective symptoms may be absent. In the vast majority of cases, however, the last named symptom of pelvic pressure with general unfitness is present and is usually paramount. So important is this one factor in the symptomatology of prolapse that we shall dignify it by naming it the *cardinal symptom*.

ANATOMIC ABNORMALITIES

As in the symptomatology, there is found in the typical reconstructive case an extraordinary complexity of corresponding tissue defects, of which may be enumerated the customary laceration of the cervix, cystocele, rectocele, diastasis of the abdominal rectus muscles, diastasis of the levator ani muscles, stretching and inadequacy of the round, broad, cardinal and uterosacral ligaments, laxness of the pelvic fascia, varicosities of the pampiniform plexus of veins, uterine malpositions of all kinds, cavernous posterior culdesac, etc., etc., and finally a descent of the uterus from its normal plane in the pelvis. Here again we have reserved until the last that one condition which we regard as of paramount importance in relation to the constitutional symptoms of the patient. By descent of the uterus we mean an actual sagging of the pivotal point of the uterus at the internal os, and it is to this sagging that we ascribe the symptom of pelvic pressure which we have designated as the cardinal symptom. To the condition of uterine descent therefore we shall apply the term *cardinal lesion*.

Doubtless this sounds very academic, possibly axiomatic, nevertheless it establishes a simple working basis on which may be elaborated a systematic surgical treatment of prolapse. Thus we may state that the first law in treating a typical case of prolapse is to repair the cardinal lesion in order to cure the cardinal symptom. Subsidiary lesions with their associated symptoms are dealt with as incidentals in completing the operation, a subject which will be discussed later on.

MECHANICAL MEASURES FOR TREATMENT

We come now to the third heading of our paper, namely, an inquiry into the mechanical means of repairing the chief anatomical defects and in discussing this part of the subject, I am conscious that I am treading on disputed ground. I wish, however, to have it understood that in dealing with this subject, I am not actuated by a controversial spirit. For I well recognize that in the performance of reconstructive surgery excellent results may be attained by more than one method. Whatever criticisms I shall make are the outcome of personal experience, and are made with the realization that certain meth-

ods that have failed in my own hands have been followed by success in those of others.

If we are right in our primary conclusion, it is evident that our chief duty in repairing a given case of genital prolapse is to restore the pivotal point of the uterus to its normal level. As this is, at least in our own opinion, the keynote to the situation, it entails a critical review of the various operations in common use, judged from this particular standpoint.

We shall first consider those operations in the use of which descent of the uterus is recognized as the cardinal lesion, and in this list would be included all operations which depend for their success on some form of ligamentary support. Operations of this kind may be divided into two important classes, first, those which aim to restore the uterus as nearly as possible to its natural position and environment, and secondly, those which seek to gain a new support by some form of artificial ligation.

I shall select for discussion certain representative procedures with which I have had personal experience.

Of all the operations which aim to restore the uterus to its natural conditions the Alexander most nearly fulfills the requirements. My personal experience with this operation dates back to a time many years ago when I was accustomed to perform it, and especially to the preparation of a paper on Retroversion, published in 1907, in which I studied the results of a series of 500 cases of retroversion and prolapse operated on by various methods then in vogue. In the investigation of the end results I found in the Alexander operation a high percentage of recurrences and on theoretical grounds this would be expected. The round ligaments are at best a variable quantity, often being so tenuous as to form little more than a fold in the peritoneum. They must therefore be unreliable as suspensory ligaments in cases where great tensile strength is required. Moreover as a mechanical principle the oblique, almost right-angle, pull which the shortened ligaments of an Alexander exert on the fundus of the uterus cannot be regarded as adequate in cases that demand suspensory power. After observing the results of the Alexander operation it was given up at the Free Hospital. I should say in justice that all these early operations were done by the original method. More modern technique has greatly improved the results as I can testify from the occasional observance of Dr. Studdiford's excellent work. I am convinced however that in marked prolapse cases the Alexander principle is unreliable.

Next to the Alexander operation, from the point of natural restoration, stands that class of operations in which the round ligaments are

reduplicated intraabdominally, of which the Coffey operation is the best example. In the investigation noted above I was enabled to observe the results of simple intraabdominal shortening, done mostly by the Wylie method. Recurrences were extremely common, amounting to over 30 per cent. This type of operation, rarely done at the present day, may be dismissed without further comment. Coffey's operation has the advantage over simple round ligament reduplication in that it also makes use of the broad ligaments. Theoretically the operation possesses the same mechanical defects as the Alexander, since the suspensory support is obliquely applied. Moreover it is upon the weaker ends of the ligaments, that the burden of support ultimately depends. Our experience with the Coffey operation was short and unsatisfactory. Partial, though never complete recurrence of the malposition was almost the rule, together with return of symptoms. Here again it must be said in justice that the operation in the hands of some seems to be a success, notably in the clinic of Dr. John G. Clark, and that we are open to the criticism that our failures may have been due to faulty technic. Granting this, I am still of the opinion that the Coffey principle is inefficient as a measure for uterine support, and that excellent as it is in some respects it has only a limited field of usefulness.

A third procedure which purports to restore the uterus to a normal condition is the so-called Baldy-Webster operation of posterior reduplication of the round ligaments drawn through rifts in the broad ligaments. I have had an opportunity to draw conclusions as to the efficacy of this operation, both from a number of my own cases and from those operated upon by other members of the Free Hospital staff. Anatomic and symptomatic results were extremely unsatisfactory. Theoretically the operation possesses the defects of both the Alexander and Coffey procedures, and in addition presents the serious disadvantage of causing post-operative adhesions that are apt to implicate the ovaries. I have had occasion not infrequently to open the abdomen after this operation, and have found not only a sagging backward of the uterus into the position of retrocession, but also in each case lateral adhesions evidently the result of traumatizing the leaves of the broad ligament.

In reporting our failure in the use of the Baldy-Webster operation, I make no apologies on the ground of possible faulty technic, but frankly state my firm conviction that the operation is based on unsound surgical principles.

Passing on to other types of operations for the relief of retrodisplacement and prolapse, we need only mention the old-fashioned ventral fixation and suspension operations which consisted of attaching

the uterine fundus to the anterior abdominal wall. These operations though often successful were also surgically ill-advised and gave so much trouble from dystocias, intestinal obstructions, post-operative adhesions, and recurrences, etc., that they were universally abandoned. The evil reputation which this type of operation attained led to the general condemnation of the hysteropexy principle, which still exists to some extent.

We come now to that class of operation which involves a suspensory shortening of the round ligaments, sometimes designated as the internal Alexander type. From the numerous operations of this form that have been devised I shall choose for discussion only those with which I have had a personal experience, namely, the Gilliam, Kelly's modification of the Gilliam, Mayo's internal Alexander, and Simpson's modification of Mayo's operation.

The Gilliam operation was very successful in our hands not only in regard to nonrecurrence of malposition, but also to its suspensory power. The direct pull of the ligaments, in cases requiring elevation of the uterus, has a great mechanical advantage over the long oblique tension characteristic of the Alexander, Coffey, and Baldy-Webster operations. Moreover it could readily be demonstrated in cases which underwent later abdominal sections that the *real supporting power* in a Gilliam operation *is attained by adhesions between the abdominal wall and the short leg of the ligamentary loop*—adhesions which were produced by the necessary traumatization of the abdominal wall. Hence it is sometimes difficult to state at a later section whether the suspension was done by the Gilliam or the Olshausen method. This is a point to which we shall refer later. The objections that we found to the operation were first that it traumatizes too greatly the abdominal wall, especially as regards the rifts made in the fascia through which the ligamentary loops are drawn and through which herniae may develop. Secondly the slack required for the loop shortens the outer legs of the ligament and thus diminishes the size of the lateral openings between the ligaments and the abdominal wall, thus increasing somewhat the danger of intestinal obstruction. Thirdly, the uterus is apt to be drawn too closely to the abdominal wall, a condition which is considerably enhanced by the too extensive adhesions resulting from the trauma to the peritoneum. This increases the danger of a loop of intestine being caught in the central opening, between the fundus of the uterus and the abdominal wall. In fact it was through this particular opening that most of the intestinal obstructions reported in the literature took place.

The Gilliam operation was given up at the Free Hospital in favor of the Kelly modification, which consisted in drawing the ligaments

through the peritoneum and muscle bellies and joining the two loops in the midline beneath the fascia. This procedure had the advantage over the Gilliam in that it could be performed more rapidly and that it avoided the undesirable openings in the fascia. On the other hand a greater loop of the round ligaments was required thus diminishing still more the lateral openings, and also limiting the mobility of the uterus. Many operations of the Kelly type were performed with results that were for the most part satisfactory. The operation was finally abandoned however in favor of the so-called Mayo's internal Alexander, by which the round ligaments are drawn through peritoneal puncture-openings at the internal inguinal rings, the loops being then drawn together over the muscles, beneath the fascia and sutured in the middle line. A great many of these operations were performed at the Free Hospital, and it is still frequently employed by one of the members of the staff. One of the chief objections to the operation is that it is necessarily limited to its scope, that is to say there is but one position and one level for the uterus to assume after the ligaments have been united, nor can this position be exactly foretold on account of the frequent variation in the anatomical attachments of the round ligament to the uterus. This limitation of adaptability is we shall see a matter of much importance.

In my personal practice, I was led to relinquish the operation after encountering several cases requiring a later abdominal section, in which the uterus was found plastered as it were to the anterolateral abdominal wall on one or both sides. In one case the uterus and adnexa were so completely adherent to the abdominal wall that they formed an uninterrupted diaphragm across the pelvis. Moreover, it was in a case operated on by the Mayo method that there occurred the only case of intestinal obstruction that has ever come to our personal notice following suspension operation.

During the period in which we were employing the Mayo internal Alexander it was frequently varied with Simpson's modification, in which the round ligaments are drawn back into the internal ring through their own sheaths. The operation was designed with the purpose of avoiding the possibility that exists in the Mayo procedure, of leaving a small lateral opening through which a loop of intestine might prolapse. Aside from this advantage the operation is more difficult and takes longer to perform, and exhibits the same defects that we have described in relation to the Mayo operation.

There remains now to mention a type of operation for prolapse which seeks to restore the organs by *support from below* rather than by suspension *from above*, and as examples of this type I shall mention those operations and their modifications which are more particu-

larly associated with the names of Watkins, Goffe, Mayo, Ward and Bissel.

Like Agag of old I approach this subject delicately. It is necessary for me at once to make the admission that not since my early work in which I discovered the futility of curing a general prolapse by ordinary plastic methods have I attempted to cure such a case solely by an operation from below, even in the face of recommendations from such eminent surgeons as those whom I have mentioned above. And this course I have pursued as the result of a conviction, acquired many years ago and strengthened by experience that the cardinal lesion of prolapse is the descent of the pivotal point of the uterus and that its cure symptomatically as well as anatomically demands an elevation of this point to a plane in the pelvis as high as it is possible to place it. It is difficult for me to conceive that this object can be attained as well by a supporting operation performed through the vagina as by a suspensory operation executed abdominally.

Having thus reviewed the advantages and disadvantages of various methods employed in the reconstruction of a prolapsed uterus we are ready to formulate a list of requirements which one would demand of an ideal operation could such be found. Primarily the procedure must repair the cardinal lesion, i.e., descensus of the pivotal point, by securing a permanent elevation of that point. Inasmuch as in cases of prolapse there is great variation in the amount of descensus and in the length of the uterine body, the ideal operation should provide that the uterus be secured in a corresponding variety of positions, and not be limited to a single one as in most of the operations described above. The proposed operation should be devoid of the danger of intestinal obstruction, dystocia, or discomforting postoperative adhesions. It should insure the permanency of the restored uterine position even in the event of later pregnancies. It should be capable of easy and rapid performance and should as little as possible traumatize, mutilate or distort the tissues involved. And finally and most important of all, it should be the means of restoring the patient to a sense of fitness and physical well-being.

Of course no such perfect operation has ever been devised, and probably never will be, but in our experience the Olshausen suspension operation more nearly meets the ideal requirements than any other with which we are familiar.

Before discussing the merits of this operation it is first necessary to describe its technic for the benefit of those who may not be familiar with it.

The round ligaments are first grasped by half length clamps at points usually about half an inch from the attachment of the ligament to the horn of the uterus. The clamps are locked somewhat tightly in order deliberately to traumatize the

peritoneal covering at those points. The uterus being brought up to the abdominal wound by traction on the clamps, beginning on the right a suture of No. 7 braided silk, doubled, is passed beneath the round ligament at the point grasped by the half length clamp. It is then passed into the abdominal wall at a chosen level, about one and a half inches from the edge of the wound, through the peritoneum, rectus muscle, and fascia. At a point about half an inch from its exit in the fascia the suture is then carried back into the peritoneal cavity through the same layers, in reverse order. While the assistant approximates the ligament to the abdominal wall by traction on the clamp, the operator draws the suture snug, removes the clamp on the ligament and clamps the suture ends without tying the knot. The same procedure is then carried out on the left side, and both knots tied inside the peritoneal cavity, that on the right being tied last. The tying of the knots is very important as they should be drawn as tightly as possible. The operation is extremely simple requiring only one or two minutes in its execution.

The rationale of the Olshausen operation is to create on each side a short powerful artificial ligamentous attachment of the round ligament close to, but never including, the uterine muscle itself. In this way the uterus is suspended from the abdominal wall directly instead of obliquely as in many other operations, but still retaining a competent mobility. The creation of an efficient artificial ligament is attained by the use of the special silk ligature, which though at first sight unsurgical in principle, is nevertheless necessary for the success of the operation. The fundamental idea is to take advantage of the adhering qualities of the peritoneum, and this is brought about by a traumatization of the contiguous peritoneal areas included in the knot. This injury to the peritoneum is first produced by the clamp which grasps the round ligament, and if need be augmented by scarifying the surfaces which are to be in contact. The really effective trauma which gives impulse to a proper adhesion reaction is gained by drawing the knot very tightly, thus causing a superficial necrosis between the two peritoneal surfaces. The large size of the silk, No. 7, braided, permits of a tight knot without breaking the suture, while its being doubled prevents cutting through the tissues included in the ligature. Doubtless also the irritating presence of the silk enhances the fibroblastic power of the subperitoneal tissue. The large silk ligatures are therefore employed for the purpose of securing a proper adhesion, rather than for any specific supporting strength. After the formation of the adhesion they work their way outward, and in a comparatively short time may be found imbedded in the muscle fibers just beneath the fascia.

We are now ready to enumerate the specific advantages which the Olshausen operation offers:

In the first place it permanently overcomes the cardinal lesion of descensus, and does so on sound mechanical principles. Moreover by creating purely artificial ligaments the restoration of the uterus is attained entirely independently of the natural ligaments. The at-

tempt to reintegrate ligaments which have already proved themselves treacherous is to my mind illogical. In this operation a better result may be achieved by the simple passing of two sutures than can be accomplished by the most laborious individual reconstruction of all the ligamentary supports of the uterus. In addition the operation offers the widest latitude in repairing varying degrees of descensus or length of uterine body. Thus the greater the amount of descensus the higher may the attachment be made on the anterior abdominal wall, even to a point half way to the umbilicus. If the descensus is so great that the uterus can be drawn completely outside the abdominal wound the fundus may be amputated, the round and broad ligaments attached to the cervical stump, and the Olshausen operation performed in the usual way. We are accustomed to employ this method in the more pronounced cases of procidentia. If perchance the uterine segment is too short as may happen in fat women with atrophied genitals, or if extra mobility is desired as in young women with simple retroversion, the ligaments may be attached at greater distances from the uterus. Thus no matter what condition presents, the desired position of the uterus may be gauged with the greatest accuracy.

Of much importance in all suspension operations is the question of future pregnancies. Dr. Richard Wadsworth of the Free Hospital staff who has delivered many of his own cases in which he had performed previous Olshausen operations states that he has never had any difficulty in the deliveries which could be attributed to the operation. He adds that during the latter few weeks of pregnancy there is apt to be some drag on the ligamentary attachments to the abdominal wall. Dr. Howard T. Swain who has attended many of my own cases in childbirth allows me to quote him as follows. "In my experience the Olshausen operation surpasses all others of its kind in surviving pregnancy and childbirth. In delivering patients on whom the operation has been performed I have had absolutely no trouble from dystocia."

A number of cases have submitted to cesarean section, in which extensive combined plastic operations have been performed, but this mode of delivery was chosen in order to avoid damage to the plastic work rather than from fear of trouble from the ligamentary suspension. The freedom from dystocias is readily accounted for by the changes that take place during pregnancy. The proximal ends of the ligament, that is to say the portions between the uterus and the artificial adhesions, which in the non-pregnant state average from $\frac{3}{4}$ to 1 inch in length, hypertrophy and stretch to an extraordinary degree, reaching a length of 6 or 8 inches. The pregnant uterus is

therefore very little limited in its normal ascent in the abdominal cavity. The drag of the ligaments is sufficient occasionally to cause some discomfort in the later stages of pregnancy but does not interfere with a natural delivery.

With regard to the danger of intestinal obstruction, I can state that no such complication has ever come to my notice nor to that of my associates who have long been using the Olshausen operation. There being no tension on the round ligaments, the lateral openings are bounded by the abdominal wall and the upper portions of the broad ligaments, flat, distensible surfaces, which one would hardly expect to incarcerate a loop of intestine. It is, of course, conceivable that the intestine might be caught in the central opening included between the two artificial ligaments. No such case however has come to our knowledge.

So adaptable is the Olshausen operation that it lends itself to the treatment of practically every condition in which uterine suspension is desirable. We are accustomed to employ it in simple retroflexions, prolapse in every degree even to the most extensive cases of procidentia, and in conservative pelvic inflammatory cases as a prophylaxis against postoperative retroversion. In the treatment of dysmenorrhea associated with antelexion it is our greatest asset. In young patients, in whom the avoidance of an abdominal scar is desirable, it may be performed through a Pfannenstiel incision, the fascia being opened longitudinally. Employed in this way it is in our opinion superior to the Alexander operation, especially as it provides more easily for incidental work in the pelvis and removal of the appendix.

In the series of procedures that make up a reconstructive operation for general prolapse the Olshausen suspension is in our hands by far the most important factor. Especially is this so in its relation to the repair of the cystocele. The attachment of the bladder to the anterior cervical wall is the golden link which no suspensionist severs, for it is by this very connection that the bladder as an organ is restored to its normal level by the elevation of the pivotal point of the uterus. The redundant sacculation of the bladder in its relation to the vagina is reduced by a local plastic operation which makes use of the vesicovaginal layer of fascia. Recurrences of cystocele are rare in our series. Suspension of the uterus does not cure the rectocele, but rather exposes it to greater abdominal pressure. Especial care is therefore required in the perineal operation. When the rectocele is pronounced a central operation implicating the rectovaginal fascia is advisable, and if need be an obliteration of Douglas' fossa by the Moschowitz principle.

Finally the relationship of the Olshausen suspension to the abdominal wall is of extreme importance. A heavy prolapsing uterus attached to a weak flabby abdominal wall is an anomaly and may lead to distressing results. The difficulty is, in all but extreme cases, obviated by a repair of the diastasis of the abdominal rectus muscles through a skin incision carried to or above the umbilicus.

Having thus extolled the merits of the Olshausen operation, we must now inquire into its demerits. The use of the bulky silk sutures is unquestionably a serious disadvantage, involving as it does an unwise surgical principle. As would be expected the suture may become infected, cause a permanent sinus and require surgical removal. This uncomfortable result occurs in a small percentage of cases as will be seen in the statistical report. The operation of removal is a minor one as the silk stitch always lies in the abdominal wall external to the peritoneum. However the use of silk cannot be avoided as it is the principal factor in producing a proper adhesion to the round ligament. Catgut and animal tendon are entirely unreliable, their use being followed by a very high percentage of recurrences. This is due partly to the fact that they do not permit the tying of a competent knot, and partly because they are not sufficiently irritating to the tissues in the production of the necessary adhesion. Linen is theoretically preferable to silk, but in practice we found that it not infrequently failed to create adequate ligamentation.

We have therefore retained the silk suture on the ground that its merits vastly outweigh its disadvantages.

STATISTICS

I have personally performed the Olshausen operation by the method I have described 1370 times, 50.2 per cent of the cases being for general prolapse of all stages. The other cases include, in the order of frequency, simple retroversion, ante flexion with retrocession, pelvic inflammation, uterine fibroids, ovarian tumors and extrauterine pregnancies. Of the 1370 cases there are recorded follow-up examinations in 746, made at periods ranging from 2 months to about 8 years after operation.

In six of the recorded cases the artificial attachment failed to hold. Of these six failures, 2 occurred where the cervical stump had been suspended for severe procidentia; 3 followed childbearing, and 1 followed suspension for simple retroversion in a patient who had had a previous recurrence after round ligament shortening.

In 15 of the 1370 cases one of the silk stitches became infected, and in 6 of these cases the stitch required removal. In the remaining cases the wound healed or the stitch was discharged spontaneously.

In 1 case a small hernia worked its way through the site of the silk ligature on one side of the wound.

There were no known cases of intestinal obstruction, nor of dystocia following the operation and this may also be said of all the cases operated on by the Olshausen method at the Free Hospital for Women by other members of the staff.

There were four deaths in the present series, one from pulmonary embolism in a case of procidentia; one from cerebral embolism in a prolapse case with a history of endocarditis; one from probable peritonitis in a case of tubercular salpingitis; and one from a typical streptococcus peritonitis. In this last case the abdomen was opened on the suspicion of an intestinal obstruction, at which time the true diagnosis was made. The patient died soon after the second operation. Thus it will be seen that none of the deaths could be attributed specifically to the Olshausen operation.

SUMMARY

We may recapitulate our observations on the Olshausen operation as follows:

1. It is the simplest and most rapidly performed of all the operations now in use for reposition of the uterus. In permanency it is the equal of any and superior to many of the other operations.

2. Its simplicity makes anatomic dissections and injury of surrounding tissues unnecessary.

3. In prolapse cases it permanently reduces the descensus of the uterus, and effectively relieves the symptom of pelvic pressure. It is versatile in its adaptation and may be applied in any condition of prolapse no matter how severe.

4. When performed in association with a cystocele it is the chief factor in curing the cystocele.

5. It is associated with an inappreciable danger of intestinal obstruction and of dystocia.

6. Its one serious drawback is the silk ligature, which however is necessary for its proper execution.

THE SOCIOLOGICAL RESPONSIBILITY OF OBSTETRICS AND GYNECOLOGY*

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SOCIAL science deals with no more humane or altruistic subject than preventive medicine. This is the link uniting the physician to the sociologist. The conservation of the essential function of woman in its relation to the individual, the home, and the nation, is particularly our obligation. Our intimate knowledge and wide experience with the functions and abnormalities of the generative tract of woman should eminently fit us to propose and evaluate all welfare movements having to do with child bearing.

Have we not here a sociological responsibility to the State and to ourselves which we are neglecting?

The people who heretofore have wished and trusted us to do their scientific thinking for them, are now attempting to do it for themselves. The sociologist is attempting to deal with our problems without our counsel. As an outcome of this, good and bad statutes conceived by sociological welfare workers rather than practical medical men are being written into the laws. This has resulted in political control, under wrong auspices, of medical problems, the laws governing which should have been instituted by the doctors themselves and the problems kept under purely medical control.

If medicine is to be practiced in the future under statutory laws, and if we may judge from the experience of all business this seems probable, it behooves the medical profession to get into closer touch with the law makers and to give more thought in the scientific bodies to constructive legislation.

The general practitioner is awake to his interests in this matter; but the majority of specialists discuss the subject very little in their scientific meetings. We are so interested in the solution of the problem of the individual patient that we lose the vision of our medical problems in the body politic.

A helpful remedy for this situation lies, in my opinion, in two things.

First.—The free discussion before our special societies, of welfare problems in which special interest, knowledge and sound judgment will there find the wisest solution. The placing on record of our policy toward such problems.

May I cite an incident exemplifying the need of this suggestion.

The chairman of the legislative committee of the New York State

*Read at the Joint Meeting of the New York and Philadelphia Obstetrical Societies at Philadelphia, April 5, 1923.

Medical Society told me that in the instance of four bills relating to obstetrics which came up during the last year, it was impossible for him to get an expression of opinion from the leading obstetrical societies of the State on any of them before the bills had to be acted upon.

My second suggestion for a remedy is personal.

Our leaders in the special branches should be more willing to become delegates to the legislative bodies of medicine, after having formulated definite policies in their scientific meetings toward particular medical problems which experience and judgment make them specially fitted to wisely devise.

In the County, State and National organizations they much prefer the pleasant atmosphere of the scientific session to the tense political environment of the House of Delegates. However here is where constructive plans must come into actual touch with the law making bodies of government.

One cannot leave this phase of the subject without a word of tribute to the men of our profession who are wrestling with our problems. Particularly would I mention the Council of the American Medical Association of the vast amount of whose effort few of us are aware of.

Three national welfare movements at the present time are demanding our judgment and appraisal.

1. The propaganda for birth control.
2. The national movement for prenatal care.
3. Midwives in America.

BIRTH CONTROL PROPAGANDA

Theodore Roosevelt once said: "The greatest of all curses is the curse of sterility, and the severest of all condemnations should be that visited upon wilful sterility. The first essential in any civilization is that the man and the woman shall be the father and the mother of healthy children, so that the race shall increase and not decrease."

Now come the Neomalthusians claiming that "if only the devastating torrent of children could be arrested for a few years it would bring untold relief." Overpopulation they say is the source of all social evil. Sutherland, an English physician, has well pointed out that their scheme is utterly unsafe, "since they argue from false premises to false deductions." "The overpopulation scare is a myth. Indeed the end of the world a philosophic and scientific certitude, is more imminent than its overpopulation." A living and a useful activity can be found for all the healthy sons and daughters that can be born.

Another group has the vision of a superrace of men developed by arbitrary control of the sexual relations of human beings, on the

scientific basis of a stock breeder's knowledge of the effects of sexual excess, heredity, polygamy, and polyandry. This argument is too materialistic for any one to accept, who has any faith in the spiritual side of human life, with its social stigmata, its religious beliefs, and its natural laws.

However the birth rate is falling in this country among the native population at least, and this is doubtless due in part to birth control, under the motive of economy. There has developed a high standard of comfort, an intensely individualistic outlook on life among men, and an emancipation and intellectual development among the women, with a refusal to accept motherhood, to the extent that in the New England States and New York, at least, the native population is not reproducing itself. The native rural population in New York is just about breaking even between births and deaths, while the foreign population is practically everywhere showing a higher degree of fecundity. Are these facts a menace to our civilization? I think not. The "melting pot" is evolving a new type of American under natural laws which will continue functioning long after birth control propaganda is forgotten.

The question of greatest interest to us in this connection is whether the results will be an amalgamation or an explosion. I will not be influenced by the present fear and pessimism.

I have the faith of Raymond Pearl: "that the kind of people who will survive and run the affairs of this country, say a couple of centuries hence, when the population pressure will be intense, will not be Englishmen, or Slavs or Jews, or Italians, but Americans, of that type which has shown the greatest adaptability to the problems which life in this part of North America has presented."

So much for the philosophical side of the question.

What can be said of the practical medical aspect of contraception? It is true that no statistical study has been made of this subject but numbers are not necessary to prove some things, and no subject lends itself less to statistical accuracy.

Every day experience of each of us will bear witness to the following facts.

1. Under legal right we now teach contraception in the presence of conditions which demand its use to conserve life,—we need no further legal liberty in this matter.

2. We are amazed at the widespread knowledge by the women of contraceptive methods. The poorest and most ignorant women have a working knowledge of contraception just as good as the most intelligent.

3. We know the fallibility of all known methods of contraceptive

effort and the very real danger to health, happiness, and even life itself that can arise from many of the procedures employed.

4. We know that permanent sterility many times follows the infection caused by the use of many of the contraceptive contrivances.

5. I believe that the known failure, at times, of all contraceptive means leads to increase of criminal abortion. Contraceptives are not a panacea for criminal abortion.

6. I believe that the source of contraceptive information should be the physicians only, the most of whom fully realize the moral and social responsibilities which they have.

7. I believe that a propaganda for birth control as at present proposed will not survive, and am unalterably opposed to it as a physician.

Statistical study of the use and utility of contraceptives may wisely be taken up in connection with my next topic.

THE NATIONAL MOVEMENT FOR PRENATAL CARE

Any movement, under whatever auspices, which has for its purpose the elevation of obstetric practice should have our endorsement.

Instead of protesting that we think the movement started under wrong auspices, based on broad generalizations and applications without due thought to its limitations; it is our privilege and duty to try to have these public moneys spent in the way our knowledge and experience points out as the most useful.

The low standard of obstetric practice in this country will surely be helped by this movement.

American midwifery has improved, under the influence of the study of mortality statistics, arousing the efforts of all obstetric practitioners and teachers to better work. This awakening of the public to the knowledge of what should be received as proper maternal care will create a demand for better obstetrics which we must meet with a more comprehensive plan for dealing with what is unquestionably a difficult problem.

Maternity centers have accomplished four things any one of which justifies their existence and assures their future.

1. An educational effort of great force awakening the people to a knowledge of what should be received as proper prenatal and confinement care.

This effort should be spread to every stratum of society.

2. The earlier discovery of some obstetric abnormalities in prospective mothers and leading them into competent care for their deliveries.

3. The earlier detection of some of the toxemias of pregnancy and the instigation of proper treatment. The available statistics on the diminished incidence of convulsions among these patients is striking.

4. The training of nurses in the technic of this special kind of work so that the effort may be extended. The demand for these nurses far exceeds the supply, showing the force there is behind the movement.

The chief difficulty with the movement lies in the inability to follow the work through delivery and postpartum period to judge its result.

Competent accouchement care must be correlated to the prenatal effort.

This demand of the public for proper care at confinement will be a great force, in compelling physicians and midwives to respect the three essentials of obstetric practice,—asepsis, abstinence from vaginal examinations, and assistance before unwise interference leads to tragedy. Few physicians and midwives fail to realize these days that they are well rid of the complicated or prolonged confinement, financially and otherwise. Many of them have learned that the hospital is their relief from a bad predicament; that the consultant comes to assist not to criticize their efforts. Even in the remote rural districts the automobile renders this aid possible save in the deepest snow of winter.

The lack of hospital beds available for the care of abnormal obstetric cases is the crying need of our scheme. General hospitals are realizing more and more this necessity and are increasing accessible facilities; but the lack is woeful yet. In New York City, in the Borough of Brooklyn, a community of over two million people, there are at present only about two hundred free beds for obstetric cases, and many of these are used for normal multiparae and not as they should be, kept only for primiparae and abnormal cases.

Here again is another sociological responsibility of ours. To in some way standardize obstetric efforts in general hospitals; and to survey and classify these beds in an effort similar to the hospital standardization study of the American College of Surgeons; and the study of the maternity problem in England under the Carnegie United Kingdom Trust. Maternity centers will only reach their full efficiency, as hospital beds are made available for the care of abnormal obstetric cases.

MIDWIVES IN AMERICA

No comprehensive study of maternity in this country can disregard the midwife.

An honorable profession in Europe is a disgrace to our specialty in this country because of the low grade of midwives who have come to our shores unrestricted. Ignorance of the immigrant masses of the need for proper confinement care, and sentimental adherence to former racial habits of life, make the midwife our problem. Regulation and education is the answer.

Considerable results have followed efforts to regulate midwives particularly in your State of Pennsylvania and in New York, but no nation-wide study of the problem has been undertaken by obstetri-

Scheme for National Organization of Effort for Improvement of American Maternal Care.

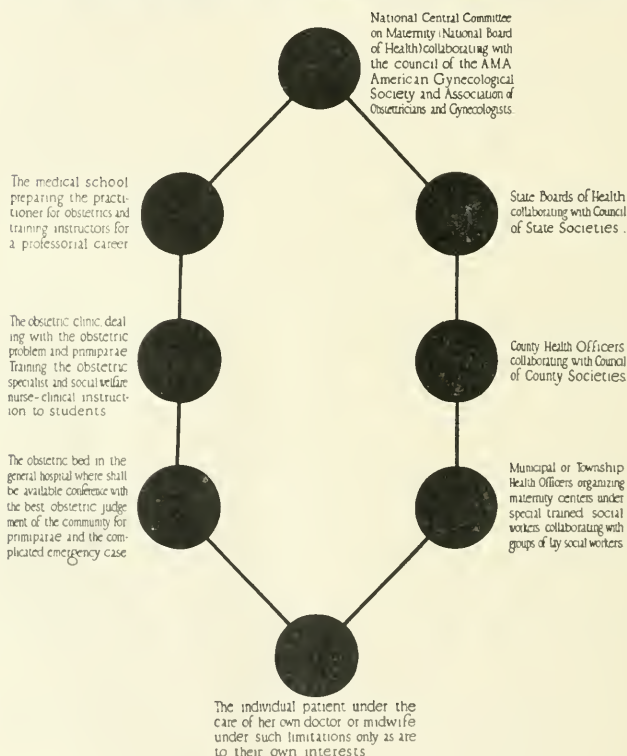


Fig. 1.

cians. Unless we suggest and press uniform regulations, social workers are going to offer a constructive plan of procedure. Efforts in this line are now being made. America is far behind England in this matter.

The ignorant midwife is here to stay until we develop a better class of women as trained obstetric attendants for normal cases, without the odium which the name midwife has in this country.

I believe such a result will gradually be accomplished, and become a very interesting social service career for women; and will help materially in the Maternity Centre problem, and the rural obstetric problem. Probably subsidizing from some source will be needed to make this successful.

In conclusion may I show graphically a scheme for organized correlation of effort for the improvement of American maternal care; a scheme which is not paternalistic or socialistic but simply in accord with American ideas of organization.

Beginning with a Central Committee extending its administrative effort through the proper channels down to the individual patient, who is to have the benefit of clinical cooperation assuring her the best of attention. (Fig. 1.)

327 WASHINGTON AVENUE.

(For discussion, see p. 238.)

CHANGES IN THE UTERINE VESSELS DURING PREGNANCY*

By O. H. SCHWARZ, M.D., AND F. P. McNALLEY, M.D., ST. LOUIS, MO.

THE study of the involution of the circulatory system of the human uterus did not receive much attention until comparatively recently. The first accurate descriptions of the various changes which occur in the vessels during involution were those made by Goodall in 1910. We have been convinced of the accuracy of Goodall's work by the study of several postpartum uteri and have for some time included in our course of obstetrical pathology sections which illustrated these changes.

Fletcher Shaw in 1917, referred to Goodall's work in describing chronic subinvolution and states that he has confirmed many of Goodall's observations in his study of similar material. The suggestion for our present study developed from certain remarks of Goodall's in his monograph. He states that there are changes present in early postpartum uteri which are of such a standing that they must have occurred days before labor was terminated and he feels that there must be a close connection between these changes and the presence of so-called placental infarcts. Further, Whitridge Williams in 1917, in a histological study of 50 uteri removed at cesarean section, in discussing vascular changes of the decidual basalis and the subjacent muscularis mentions the presence of certain fibrinoid tissue and certain hyaline structures of bizarre

*Read at the Meeting of the Washington University Medical Society, St. Louis, Mo., April 10, 1923. From the Department of Obstetrics, Washington University School of Medicine.

outline in collapsed vessels. He mentions that since 1910 these have been extensively studied by Frankl and Stolper, Schickele, Heckner, Hinselman and others, but no general agreement has been reached as regards their mode of production, although the prevailing opinion is

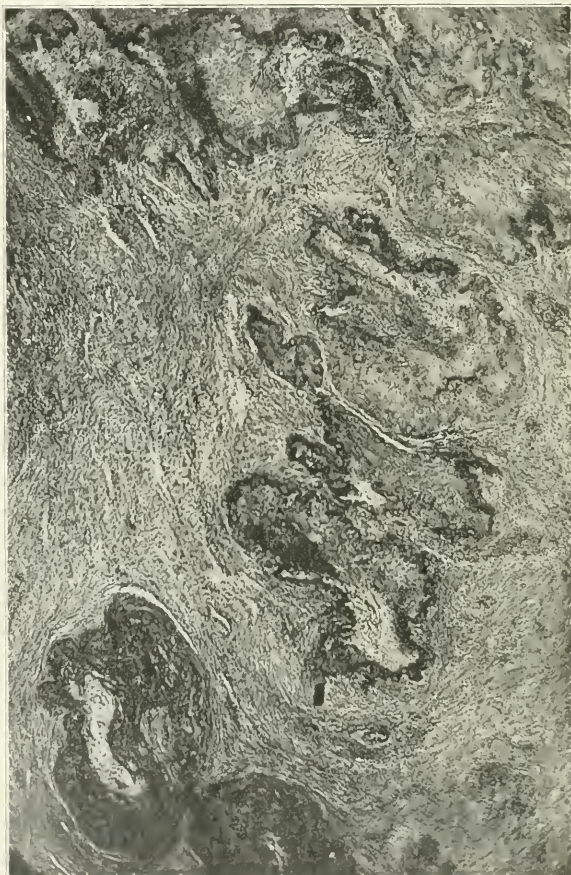


Fig. 1.—Ob. Path. No. 2352. Orcein-Van Gieson Stain. Uterus twelve days post-partum. Picture shows a group of arteries in various stages of degeneration. The upper vessels show practically the same stage. The internal elastic membrane is seen as a swollen, blackish-red, irregular band, with marked swelling of the intima. In some places the internal elastic membrane has already become diffused and lost its staining reaction. The two lower vessels show arteries which stain a brick-red, all traces of the internal elastic membrane being lost.

that they are due to the invasion of the vessel walls by fetal elements, with subsequent fibrinoid degeneration. He states that he found these changes in twenty-seven of fifty specimens. He was not at that time prepared to express a definite opinion as to the mode of production or their significance, but that within a reasonable time he expects to publish a communication upon the subject, which he hopes will aid in its solution.



Fig. 2.—Ob. Path. No. 2352. Orcein-Van Gieson Stain. High power of Fig. 1. Shows markedly swollen internal elastic membrane staining blackish-red, with swollen intima and swollen media.

The work of Frankl and Stolper, Schiebele and Heckner pertains chiefly to the changes of the intima. To these changes we will refer later, and so far as we know, only brief references regarding the more extensive vessel changes have been made, namely, by Schiebele, Williams and Heckner, but their relationship to changes occurring after delivery were not pointed out. Although the work of the foreign writers

appeared later than that of Goodall, they make no reference to this author.

Goodall studied only uteri in the puerperium. His earliest case was forty-four hours postpartum. Concerning his findings in this specimen he states that among the vessels of the uterine wall in the direct path of the placental circulation, both in the lower mucosa and in the innermost muscularis, there are some which show changes of such a character that the process must have taken days at least in its development. These vessels, it is true, are relatively few in number but are often of very large size and therefore must have played no small part in the placental



Fig. 3.—Ob. Path. No. 3290. Orcein-Van Gieson Stain. Five days postpartum uterus, showing marked swelling of the intima and media, with beginning breaking up of internal elastic membrane.

circulation. A close examination of such a vessel shows the changes already described as affecting the vessels before labor. These changes as regards the artery are briefly: The swelling of the internal elastic membrane which later breaks up and is diffused through the remaining thickened and degenerating vessel wall. During this process of swelling, which in many instances is quite enormous, they appear in different stages and show a distinct change in staining reaction. Weigert-Van Gieson stain is used. With the first swelling the elastica appears black and this is gradually changed into a deep, port-wine red color, which later changes to a brick-red and then fades into a pale yellow. When

the pale yellow stage is reached, absorption takes place and the entire vessel wall disappears in due time, provided that involution is complete. In these changes which Goodall describes as occurring before delivery, the degenerated elastica is frequently present as a yellow-staining, thickened band with here and there remains of the brick-red color. All stages of transition from one color to the other are found.

The changes in the veins are briefly: A diffuse thickening of the entire wall, with a marked hyaline change in fibrous, elastic and muscle

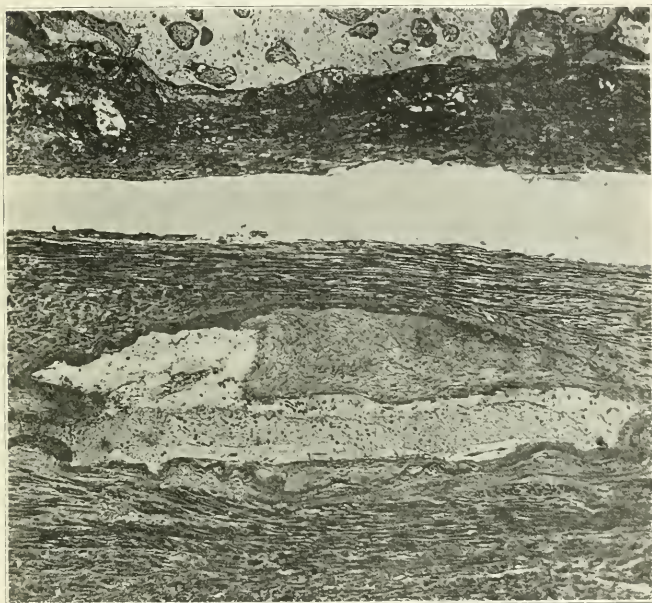


Fig. 4.—Ob. Path. No. 2734. Haematoxylin-Eosin Stain. Thirty-six weeks pregnant uterus. Shows a large artery with swollen internal elastic membrane around entire vessel. This membrane stains yellow with Weigerts, showing its degenerated state. Normal vessels in some section stain well. It also shows in the upper portion a well developed intimal plaque.

tissues; this degenerated tissue is absorbed during the process of involution and the new vein wall is chiefly rebuilt by the proliferation of the remaining muscle cells of the media. If the hyaline material is not completely absorbed, just as is the case in subinvolution of the arteries, it is diffused throughout the vein wall, particularly near the periphery between the muscle fibers of the media and appears as black areas when stained with Weigert's or Van Gieson stain. The black staining prop-

erty is due to the fact that the dead, diffused elastic tissue in time regains its ability to take up the Weigert's stain.

In regard to the changes of the intima, Frankl and Stolper give the best descriptions. They describe thickening of the intima with the presence of a fibrous tissue. This condition occurs during the latter half of



Fig. 5.—Ob. Path. No. 2734. Haematoxylin-Eosin Stain. Shows two vessels with well developed intimal plaques. The internal elastic membrane did not take the Weigerts stain.

pregnancy and is found in greater degree as term is approached. They feel that these changes are due to the fact that earlier in pregnancy, for example, just before mid-pregnancy, that there are larger cells present in the intima and media. These cells are described as being decidual-like

in character and that they arise *in situ*, in other words, from the pre-existing cells in the particular location concerned. They differentiate these cells from synektial cells, the wandering cells of the fetal ectoderm, by the fact that they always occur as single cells and that their nuclei are less deeply stained. They call attention to the fact that they are more difficult to differentiate from Langhans' cells, but as they are seen most frequently at the time when the Langhans' cells are disappearing and by the fact that their protoplasm is much larger than that of Langhans' cells. They feel that the cells cannot be considered endo-



Fig. 6.—Ob. Path. No. 2205. Orcein-Van Gieson Stain. Uterus at term. Shows markedly degenerated vessels. Internal elastic membrane markedly swollen, stains reddish-black. Marked thickening of intima practically obliterating the lumen. Identical to changes in postpartum uterus.

thelial proliferation because they make their first appearance deeper in the wall of the vessel.

When these cells project into the lumen the endothelial lining is lost, but when they assume the fibrous tissue appearance in later pregnancy the endothelium has recovered the masses. They also point out that staining with orcein in the lesions of later pregnancy shows these masses to be intimal in nature by the fact that the normal elastic intima can be shown to be intact beyond the lesion. The importance they attach to these changes is that under the influence of contractions the vessels

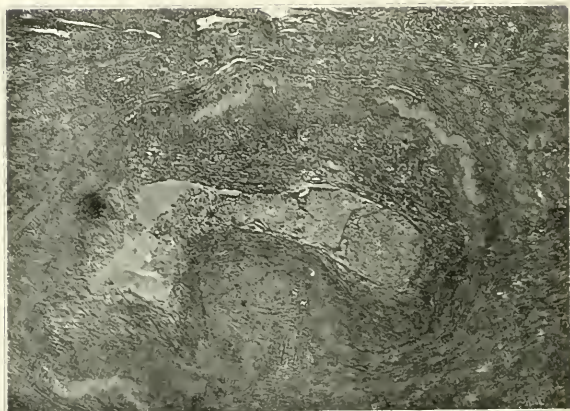


Fig. 7.—Ob. Path. No. 2990.—Orcein-Van Gieson Stain. Thirty-seven weeks pregnant uterus. Shows a markedly thickened vessel with thickened intima and narrowed lumen. In the lower right-hand corner can be seen a thin, black strand which represents the remaining portion of the internal elastic membrane. The lighter areas represent the remaining portion of the degenerated internal elastic membrane which stained pale yellow. Other portions entirely lacking.

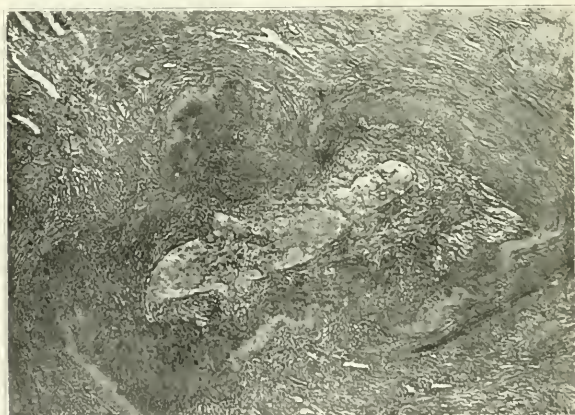


Fig. 8.—Ob. Path. No. 2990. Orcein-Van Gieson Stain. This vessel was adjacent to the one illustrated in Fig. 7. The changes here are identical but slightly more advanced. In this case as many as half a dozen vessels of large size in one field showed these changes.

become occluded and that these projections could act as supports for the formation of thrombi in causing primary closure of the vessel. They state that the vessel changes which Schickele has described as accompanying premature separation of the placenta are physiological retrograde changes of the vessel wall and need a more exact investigation. They feel that these vessel changes are not necessarily characteristic of this condition.

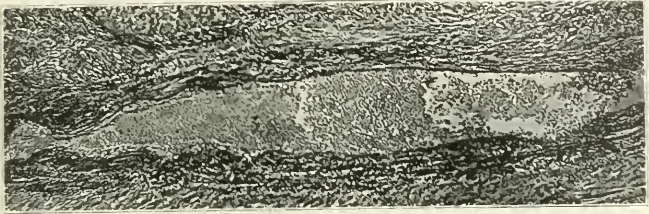


Fig. 9.—Orcein-Van Gieson Stain. Normal uterus at term. Showing a normal vein. Its enlargement and thinness of its walls are the conspicuous features.

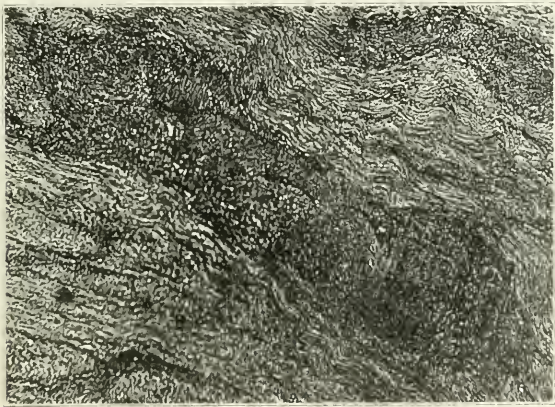


Fig. 10.—Ob. Path. No. 3290. Orcein-Van Gieson Stain. Five days postpartum uterus. Shows the vein with lumen obliterated by the swelling of the wall as a whole and the compression of the adjacent uterine musculature. The black strands in the center of the vessel represent the endothelial lining. The vessel stains a brownish-red, due to beginning hyaline degeneration.

Heckner in discussing the results in an investigation of the vessels of the puerperal and pregnant uterus, states that in regard to the puerperal vessels, swelling and loosening of the endothelium is the only constant finding and that thickened areas of intima are only found in some cases and that fetal ectodermal cells and clots in the lumen do not occur

in all cases. The hyaline degeneration of the vessel wall is a product of the late puerperium. Concerning the changes during pregnancy, he states that swelling of the endothelium occurs and projections of thickened intima are seen, but by no means in all cases. He feels that these changes influence the flow of the blood and in this way increase the tendency to coagulation. Entire occlusion of these proliferations is not established. Thrombus formation and organization are not brought about by these changes but they may act as supports for them.

Schickele in a study of similar material, points out the early presence of fetal elements and considers that these elements are the most important factors in the production of these antepartum and postpartum changes.

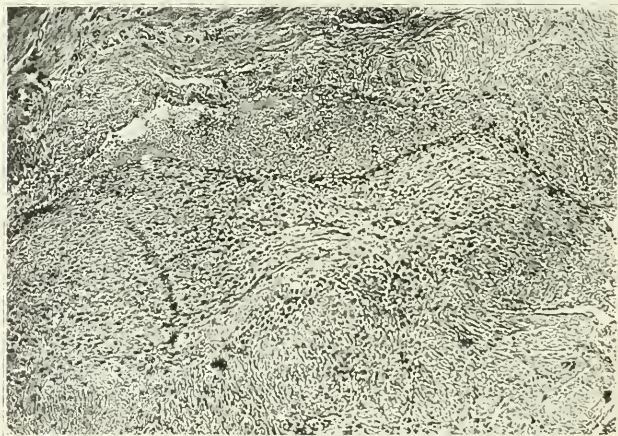


Fig. 11.—Ob. Path. No. 3149. Haematoxylin-Eosin Stain. Thirty-eight weeks pregnant uterus. Shows a large vein, the inner third showing marked thickening of wall in one portion; the remainder of the wall apparently normal. Suggestive of hyaline change.

Although Goodall did not describe these intimal changes in his work, he points out the following: "Another point of interest in the series is the question of the development of the so-called 'hyperplastic intimal layers' found by several authors in the general circulatory system and so well described by Jores in his monograph on 'Arteriosclerosis.' Thoma and his school contend that the growth of hyperplastic layers is a result of the slowing of the blood stream, and lowering of the blood pressure. He came to this decision owing to the increase in the intima of fetal vessels (which carried blood to and from the placenta), after the placental circulation had been cut off by severance of the umbilical cord. Owing to the blood being directed into new channels the intimal

layers increased to reduce the lumen. From this special case he made a general application of his theory that hyperplastic changes in the intima are due to the two causes given above.

"Later it was found that such hyperplastic intimal layers occur throughout the general arterial system and that such change is not confined, as Thoma thought, to the intrafetal vessels coursing to and from the umbilicus. The fact that these layers are found generally throughout the body, the fact also that they grow gradually more numerous from childhood on to thirty years of age, the fact also that they occur in hypertrophied conditions, led Jores to refute Thoma's theory and to contend that the production of these layers is an index of hypertrophy

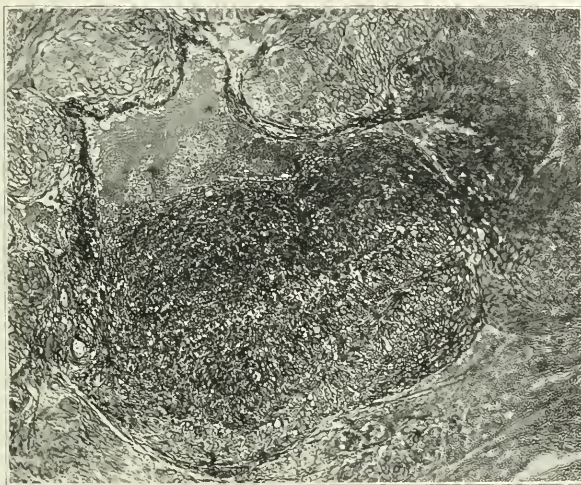


Fig. 12.—Ob. Path. No. 3149. Orcein-Van Gieson Stain. Showing marked degenerative area in vein which has all the appearance of similar changes which occur in the postpartum uterus. This was the only case in which these venous changes were at all pronounced.

called forth by the increasing blood pressure as the child advances in years to manhood. It has been stated that many of the arteries in the uterus at the end of pregnancy show the development of hyperplastic intimal layers where previously they were absent. From this it would seem that the increased work and pressure put upon the arteries had called forth the building of these layers to strengthen the walls. This would certainly be in accord with the theory of Fuchs and Jores. But we also find that in many vessels which have to reduce their lumen but slightly, this is brought about in a manner that is similar in every detail to that of building a hyperplastic layer. Now in such a case the

cause of this new growth is certainly not an increase in blood pressure, but is a condition analogous in almost every circumstance with that of the intrafetal umbilical vessels. In such a uterus the building of the hyperplastic layer is an endeavor on the part of the artery to reduce its caliber to the demands made upon it, just as Thoma found in the vessels of the newborn. Work certainly seems to prove that both Jores and Thoma are right in their theories, and that lowered blood pressure and slowing of the blood stream on the one hand, as well as high blood pressure and increased work on the other, can call forth the same results."

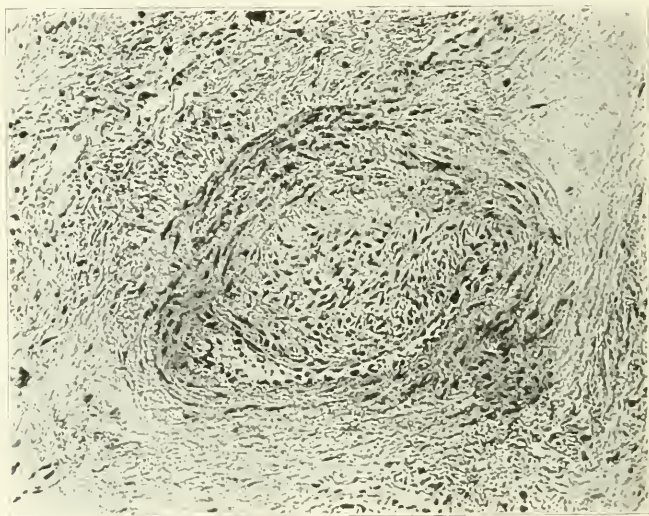


Fig. 13.—Ob. Path. No. 3149. Haematoxylin-Eosin Stain. Showing small artery with marked localized thickening of intima. No fatty changes or wandering cells present.

Without going into any greater detail concerning these changes we will briefly describe the character of the material which was available for our study and the method in which it was studied. We may say that we were primarily interested in trying to discover changes analogous to the changes which Goodall described as postpartum changes. Our attention was soon attracted to the frequent thickening of the intima in various locations, so we also investigated these lesions. There were in all 24 uteri, 4 of which were from early pregnancies between 14 and 19 weeks; two between 24 and 36 weeks; 12 between 36 and 40 weeks, and 5 in the early puerperium, and one five months postpartum. We shall

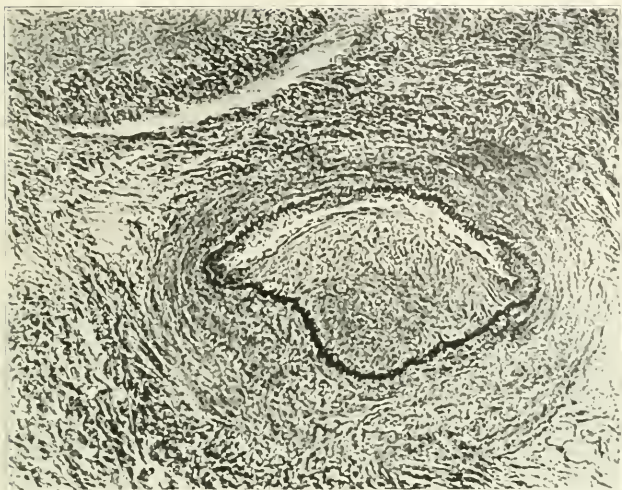


Fig. 14.—Ob. Path. No. 3149. Same vessel as in Fig. 13. Showing a beautiful normal internal elastic membrane, with the swelling entirely within this structure.

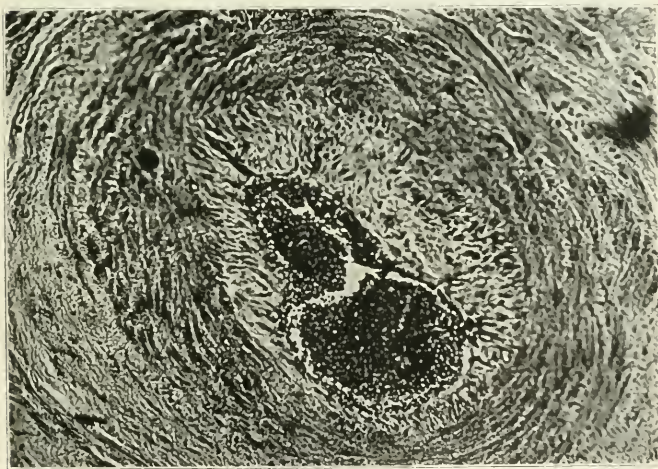


Fig. 15.—Ob. Path. No. 2788. Haematoxylin-Eosin Stain. Sixteen weeks pregnant uterus. Showing a markedly swollen artery made up of large cells which appear as the cells of the vessel itself. Not suggestive of fetal ectoderm. The intima is also included in this swelling.

consider first those cases which were from pregnancies of 36 to 40 weeks. These specimens were for the most part obtained at cesarean section with hysterectomy, in cases of contracted pelvis, and also at autopsy, pneumonia and toxemia of pregnancy being the contributing cause of death.

The intimal changes consisted from small fibrous tissue-like plaques to complete involvement of the entire wall; there was no evidence of definite fatty change in these plaques, nor were wandering cells in evidence, as in ordinary arteriosclerosis. These changes were found in 11 out of 12 cases and they were quite marked in 7; in 3 they were quite definitely present. The more marked vessel changes, that is those which

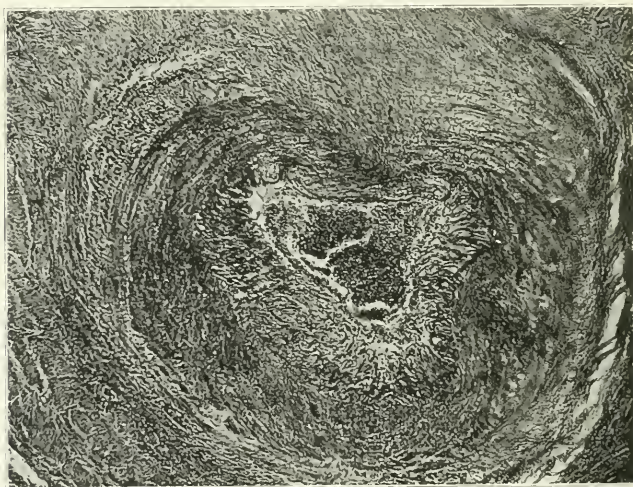


Fig. 16.—Ob. Path. No. 2788. Orcein-Van Gieson Stain. Same vessel that is illustrated in Fig. 15. The internal elastic membrane is not clearly seen in the picture but is diffused and split throughout the inner third of the vessel wall. These fine strands take the Orcein stain quite distinctly.

show the same characteristics as described by Goodall, were present in 10 out of the 12 cases; they were unusually striking in two cases and they were well marked in 4 others; they were definitely present but to a lesser degree in 3 cases.

The changes in the veins in all of the postpartum uteri were very striking in all but one case, in which case many of the veins were swollen and showed some hyalinization. In the early cases there were no definite changes found in the veins. In the cases near or at term the veins were markedly enlarged, with comparatively thin walls, and as a result of the collapse of the uterus following the removal of the child

they are frequently found compressed and buckled in. Changes analogous to those found postpartum were lacking in all but two specimens—in one of these the changes were slight, but in the other they were very striking, as the illustration of one of these vessels will bring out. Organizing thrombi were lacking except in one case, nor were there any other veins which were obliterated by thrombus formation. The one case showed several vessels at the musculo-decidual junction with organizing thrombi. The character of these changes will be best appreciated by the study of the included illustrations.

Our findings in the postpartum cases agree in every respect to those of Goodall, with the exception that we were impressed very definitely with the thickened intima associated with many of these degenerations, a finding which Goodall does not particularly emphasize.

In the course of early pregnancy between 24 and 36 weeks, the intimal changes were definitely present in the earlier cases which were 4 in number. In one instance there were no changes and in the other three instances there were definite intimal changes, with a suggestion of decidual-like change in two cases. In one there was some degeneration of the internal elastic membrane. These changes do not, of course, in any section involve the majority of vessels; they are only present in sufficient degree to make the change particularly striking and easy of recognition.

We concluded, therefore, that these degenerative changes of the more extensive type, such as described by Goodall as occurring postpartum, occur frequently in the uterus near or at term. That they are of some significance, if at all marked, we feel quite definitely. Further, one of us quite independently, found that in three cases which showed the most marked vessel changes there was extensive infarct formation in the placenta present in each instance.

The question naturally arises—do these changes have any clinical significance? Do they in any way explain any of the complications of pregnancy or any of the abnormalities seen in the placenta? We believe that such an interpretation is possible.

If we consider that the villi are dependent upon the maternal rather than the fetal circulation, as has been pointed out by Young and with whom we agree, such interference with the blood supply of the placental site as must take place with the narrowing or obliteration of the vessels above described must cause death of tissue dependent on them for nourishment—in other words, infarct formation. The more frequent and advanced changes in vessels in toxemic cases in which also there is extensive infarct formation, is in accord with this view, as has previously been pointed out by Goodall.

Regardless of whatever etiological factors may be claimed for the serious complications variously termed: Premature detachment of a

TABLE I
CLASSIFICATION OF MATERIAL

EARLY PREGNANCY								
LABORATORY NUMBER	AGE	GRAVIDA	DURATION OF PREGNANCY	HOW OBTAINED	CONDITION	CHANGES IN ARTERIES		CHANGES IN VEINS
						INITIAL CHANGES	MORE ADVANCED CHANGES	
2672	—	—	14 weeks	Hysterectomy	Uterine bleeding	Definite	Negative	Negative
2788	—	—	16 weeks	Hysterectomy	Myoma	Definite	Definite	Negative
1647	36	9	19 weeks	Hysterectomy	Uterine bleeding	Definite	Negative	Negative
2868	—	—	16 weeks	Hysterectomy	Hydatidiform mole	Negative	Negative	Negative
PREGNANCY—24 TO 36 WEEKS								
2602	23	6	28 weeks	Autopsy Postmortem section	Acute miliary tuberculosis	Marked Definite	Slight Negative	Fresh Thrombi Negative
3311	22	1	32 weeks					
PREGNANCY—36 TO 40 WEEKS								
2734	—	—	36 weeks	Autopsy	Pneumonia	Very Marked	Very Marked	Slight
3332	39	2	40 weeks	Autopsy i m c d. after delivery	Acute nephritis	Marked	Marked	Negative
2990	25	2	37 weeks	Autopsy 2 hrs. after delivery	Chronic nephritis, Blood pressure 170	Marked	Marked	Negative
3344	28	2	41 weeks	Porro-section	Contracted pelvis	Marked	Marked	Negative
2158	36	5	40 weeks	Postmortem section	Pneumonia	Definite	Definite	Negative
1428	—	—	40 weeks	Porro-section	Double uterus	Slight	Definite	Negative
3224	28	3	40 weeks	Porro-section	Ruptured cesarean scar	Marked	Definite	Negative
2205	24	2	40 weeks	Porro-section	Contracted pelvis, Marked deformity	Definite	Very Marked	Negative
3149	19	1	38 weeks	Porro-section	from coxitis	Marked	Definite	Marked
3476	—	—	42 weeks	Autopsy	Death from exhaustion. Contraction ring. Patient died undelivered	Marked	Marked	Negative
1557	22	2	40 weeks	Porro-section		Very Marked	Negative	Negative
1732	—	—	40 weeks	Porro-section		Negative	Negative	Negative

POSTPARTUM CASES

LABORATORY NUMBER	AGE	NUMBER OF PREGNANCIES	NUMBER OF DAYS POSTPARTUM	HOW OBTAINED	CHANGES IN ARTERIES		CHANGES IN VEINS
					INITIAL CHANGES	MORE ADVANCED CHANGES	
3412	25	2	2 days	Autopsy.	Definite	Slight	Slight
2037	45	9	4 days	Autopsy	Negative	Marked	Marked
2352	29	5	12 days	Autopsy	Marked	Very Marked	Marked
2179	26	1	4 days	Autopsy.	Marked	Marked	Marked
3290	15	1	5 days	Autopsy.	Very Marked	Marked	Marked
2376	36	2	5 months	Autopsy	Negative	Very Marked	Old

(Table explained in text.) Several specimens obtained without history from outside sources.

normally implanted placenta, abruptio placenta, and uteroplacental apoplexy, it must be admitted that certainly the immediate cause must be the sudden escape under pressure of blood from the normal channels just as in those cases of hemorrhage into the internal capsule. For this reason we feel the term "uteroplacental apoplexy" is the preferable term for this condition. Now let us see if the above described vessel changes will in any way favor the occurrence of this condition.

In the majority of those cases there is already a hypertension of varying degree. Add to this the increased tension that must occur proximally to the narrowing or obliteration of vessels, whether artery or vein, which we have shown, and we have one of the conditions satisfied. The degenerative changes with consequent weakening of the vessel wall adds the other condition which makes the circumstances ideal for the production of rupture and hemorrhage. On the site and extent of the rupture depends the pathological picture. If relatively small and in the decidua basalis there occurs the small retroplacental hemorrhages of no clinical significance. The deeper in the wall it occurs, the more extensive the apoplexy, in some cases giving the characteristic infiltration with blood of the entire uterus and in some cases of the broad ligaments, tubes, ovaries, etc.

THE TREATMENT OF BENIGN UTERINE HEMORRHAGE BY IRRADIATION*

AN ANALYSIS OF 100 CASES

BY W. C. DANFORTH, B.S., M.D., F.A.C.S., EVANSTON, ILL.

OUR experience in the treatment of uterine bleeding of nonmalignant origin now includes 100 cases. The larger part of these have been cared for upon our own service in the Evanston Hospital. The remainder were treated upon the general surgical service, the records of these cases being kindly placed at my disposal by Dr. W. R. Parkes. In our treatment of these cases we have adhered strictly to the indications and contraindications which have been discussed in other publications upon this subject by various workers. We agree with Clark and Keene that irradiation for bleeding of uterine origin is distinctly a form of therapy which should be directed by the surgeon, and preferably by a surgeon of some gynecological training, rather than by the radiologist. We have seen two cases which have particularly confirmed us in this view. Radium therapy is particularly applicable to women at or about the time of the climacterium and the indications for its use in the earlier decades should be clearly es-

*Read at a meeting of the Evanston Hospital Attending Staff.

tablished before applying it. Under the age of 40 its use is not lightly to be regarded, for the complete inhibition of ovarian function which the usual dose for myopathic bleeding brings with it may have consequences which are more serious than the disease which we attempt to eliminate.

We have carefully excluded from treatment all cases giving a history of pelvic infection. The application of radium in these cases is distinctly dangerous, as it may be followed by a recurrence of an old infection. Particularly is this apt to be true in cases in which puerperal sepsis has occurred or in which infection has followed abortion, particularly if the infection follows an abortion criminally induced. These are likely to harbor streptococci for long periods of time. The effect of irradiation upon a latent infection will easily be understood if one appreciates the extent of the change within the uterus produced by the application of radium. We have recently had an opportunity of examining a uterus which had received 1200 milligram hours of radium. Diagnostic curettage was carried out prior to the introduction of the radium and the microscopic examination of the material obtained revealed adenocarcinoma of the body of the uterus, for which hysterectomy was done about one week after the irradiation. Grossly the endometrium and uterine musculature immediately underlying it was reduced to a gray sloughing mass, completely necrotic. The microscope showed necrosis of these layers with marked round cell infiltration of the uterine wall underlying the stratum of necrosis. Clearly, a trauma of this severity cannot safely be applied where infection may remain.

In those cases in which we have irradiated for bleeding occasioned by fibroids we have recognized a third limitation, that imposed by the size of the growth. We have been governed by what, when compared with the indications stated in some other reports, may seem rather an extreme conservatism, in that we, in addition to restricting irradiation to cases well over 40 and without suspicion of infection, have applied it only to very small fibroids. Our upward limit has never allowed irradiation in growths over the size of three and one-half months' pregnancy and we have for some time been even more conservative, limiting it as a rule at present to fibroids not larger than a two and one-half to three months' pregnancy. We have feared the degenerative changes which might be produced in the large growths, particularly in those of the submucous type. In the younger women, or when the growth is larger than has been stated, we prefer surgical removal. These rather strict limitations account for the small number of fibroids in the series.

We have divided our cases into classes according to age as follows: under 20, from 20 to 30, from 30 to 40, from 40 to 50 and over 50.

Of those under 20 there has been but one case, that of a girl of 15 who bled severely and repeatedly until her blood picture and general physical condition demanded effective means of stopping the constant loss of blood. We have observed a considerable number of these cases, but we believe that irradiation is quite distinctly a measure of last resort, to be used only after rest and glandular therapy have been patiently tried and in which anemia is sufficiently grave to necessitate prompt relief. In the majority of instances the menstrual cycle becomes normal without interference, time probably being of more importance than any form of treatment. In passing, it may be said that the curettage so frequently done on cases of this sort is useless, sometimes harmful and should be condemned. The endometrium is not the causative factor. This is to be found in a disturbed function of the ovary, resulting in a more than normal bleeding. When this is resistant to other measures and the condition resulting from continued bleeding demands relief a small dose of radium may be tried, not over 250 milligram hours, and preferably less. This in the single case so treated was sufficient to produce an amenorrhea for two months and to reduce the flow thereafter to normal. A second dose may be used if needed but should by no means be given under four and better six months. A permanent amenorrhea produced by radium is as irremediable as one caused by the removal of the ovaries, a condition which is disastrous in a young girl.

In the group of cases between 20 and 30 years there were two cases which were treated. In this group also one selects the cases with great care as the result of too intensive irradiation is scarcely less serious than in the group last considered. Hemorrhage from fibroids in women within this age group is, in our opinion, far better treated by operation, allowing one or both ovaries to remain.

When radium is used for the treatment of young women a dose much smaller than that used in women in the climacteric years should be given.

Fifty milligrams for from six to ten hours is usually sufficient in this group of cases. This will usually cause an amenorrhea for several months with a return to an approximately normal menstrual cycle. One exception to this mode of treatment has occurred in our experience. This was one of the two cases noted as having been treated between the ages of 20 and 30. This patient was a young woman of 22, who one year prior to the time she was irradiated had had a severe uterine hemorrhage for which she was treated elsewhere by curettage and uterine packing. She had been advised, should similar bleeding recur, to have a hysterectomy preceded by transfusion if her condition were such that the operation should not safely be done without it.

When first seen she had bled continuously for a month, and had a

hemoglobin percentage of 16 and a red cell count of 900,000. Operation was obviously out of the question. The bleeding was controlled for several days by packing with a strip of gauze soaked in perchloride of iron, after which she received 1200 milligram hours of radium. The large dose was given because her condition had on two occasions been so serious that the preservation of her life concerned us more than the maintenance of reproductive activity. She had no reappearance of menstruation for ten months, after which a scanty menstruation appeared. This had continued up to the time of the last report from her physician, about one year after the reappearance of the menses.

In the decade from thirty to forty the cases became more numerous. In the early thirties one still is conservative as to dosage but as the end of this period is approached the question of children is as a rule settled and does not require such careful consideration. In this group we find eighteen cases. One of these was a cretin under observation in our medical out-patient department. When referred to us rest and glandular therapy failed to relieve her. Two applications of radium were needed to control bleeding. This we did not hesitate to use as the preservation of reproductive power was not important in view of her general condition.

In the decade from forty to fifty we find the largest group of cases, numbering sixty-five. The cases in this group were all treated by a full dose of 1000 to 1200 milligram hours. Here we need not consider future pregnancy and may proceed at once with the idea of permanently stopping bleeding. One may confidently expect this in the great majority of cases treated by full dosage, the monthly flow usually disappearing permanently. We prefer in this group of cases to give the entire dose at once, subjecting the woman to the inconvenience of but one stay in the hospital and to the small risk of infection which the procedure entails on one occasion only. For cases of bleeding of myopathic origin or in small fibroids in women of this age group irradiation easily excels all other modes of treatment.

We have also treated fourteen women of over fifty years. In these we have had uniformly good results with dosages similar to those used in the previous group.

Of the total number of cases in the various age groups which were treated by full dosage we have had eight failures. Of these five were relieved by a second application while three required operation. One of these refused a second irradiation, which might have relieved her.

We have had no mortality and no morbidity. As the mortality of hysterectomy in expert hands appears to be about 1.7 per cent, and probably is more nearly 2 per cent, the chances are that in this

same series of cases, had all been subjected to operation, we would not have escaped without a death. The mortality of hysterectomy the country over, in the hands of all classes of operators, is probably much greater.

About a third of our patients had one period after irradiation. If treatment is given shortly prior to a period, bleeding seems more likely than if it is given a longer time before it. Ordinarily the period is scanty. Sometimes it is more profuse than had been the rule with the same woman. Particularly does this seem to be true when a fibroid is present. Occasionally a second bleeding occurs which as a rule is very slight. Again this is more apt to occur if a fibroid is present.

Menopause symptoms have not been a troublesome factor in this series. Only occasionally has complaint been made and this has in no case been serious. It has not seemed that any more discomfort occurred than that some women would probably have had in a menopause coming on of itself.

Some of our cases have complained of a leucorrhea for a time. This has as a rule disappeared after a few months and in a few a previously troublesome leucorrhea was benefited.

A watery discharge also is seen in about a third of the cases. This disappears of itself in six to ten weeks and needs no treatment.

The technic followed in this series is very simple and does not differ materially from that described by others. Under a nitrous oxide anesthesia a dilatation and curettage are done, the material obtained being saved for microscopic examination. In this way an occasional carcinoma of the body of the uterus will not be overlooked. It is a very decided advantage if the pathologist who carries out these examinations has some experience in the examination of such tissue. Error sometimes arises from lack of familiarity with the cyclic menstrual changes. We have in two instances had diagnoses of carcinoma of the body of the uterus returned from the laboratory in cases in which clinically one would not regard carcinoma as probable, and in both of which extended observation proved carcinoma to be impossible. One of these women has since had a child. Conversely, in one instance carcinoma was not recognized in a case in which it was subsequently found to be present. None of these cases form a part of this series. Mention of them is made only to emphasize the importance of a thoroughly careful consideration of this phase of the care of this class of cases. In most well organized hospitals, at least in the large centers, this is provided for.

After curettage and iodination of the uterine canal the radium capsule is introduced to the fundus. Usually we have employed 50 milligrams screened with one millimeter of brass with a layer of pure

gum rubber wrapped about the capsule. In a number of cases we have used 75 or 100 milligrams similarly screened and arranged in tandem. This reduces time and nausea and in one which contains fibroids, enables the radiation to cover a larger area.

The vaginal walls are held away from one another by packing to protect the bladder and rectum. In case the uterine canal is rendered so tortuous by tumor growth as to make it appear that there may be any difficulty in removing the radium it is better to desist.

During the period of irradiation we have had nausea occur in a little over one-half of our patients. This ceases almost invariably quite promptly on the removal of the applicator. In only one instance was it severe enough to cause anxiety during irradiation. In this case it continued for two days after irradiation. This woman gave a history of therapeutic abortion after vomiting, of eclampsia in her single pregnancy which went to term and of severe dysmenorrhea. She appeared to be of a rather neurotic type.

We have had no unfavorable results after sufficient time had elapsed for irradiation to have produced whatever change could follow its use. Some of our earlier cases were treated nearly four years ago. We have had no reports of any unfavorable results which we could ascribe to radium. We believe therefore that criticism of irradiation in benign hemorrhage based upon late harmful results is not well founded.

There were seven cases in which the first treatment failed, necessitating either operation or a second irradiation. We had therefore 98 per cent of successes.

Of the cases which were operated upon after irradiation one was a simple myopathic hemorrhage, the uterus being scarcely larger than that of a healthy young woman. No lessening of bleeding followed 1200 milligram hours. This woman refused further treatment with radium, and, as she was bleeding actively, and six months after irradiation had a hemoglobin percentage of 35, a supravaginal hysterectomy was done.

A second case was that of a woman who supported herself by scrubbing. As radium did not relieve her and it was necessary that she be put in condition to support herself as rapidly as possible she requested operation. She had returned to hard work within a week after her treatment with radium. Another woman was operated upon in China where she was serving as a missionary, about eighteen months after receiving 1200 milligram hours.

The five who were irradiated a second time were all women of very active life. One was a school teacher, one was a trained nurse, one a business woman, and two were laboring women. We cannot, of course, state that activity causes a lessened chance of cure although the facts

would seem to suggest it. Ninety-seven per cent were eventually relieved by irradiation. We have reckoned a cure as the cessation of bleeding in the older women and a return to a normal amount of flow in the younger women. It is an advantage in the latter, if radium is used at all, that they should be relieved of the results of too great blood loss without complete amenorrhea.

It seems to us that a procedure which is capable of giving results as favorable as those we have recorded, with both danger and discomfort reduced to a minimum, must be regarded as the method of choice for the management of this class of cases. It is not properly a competitor of surgery. On the contrary, it should be regarded as a form of surgical therapy. Certain cases should be definitely excluded from radium therapy and should be operated upon, while another group equally clearly are better treated by irradiation. Both surgical treatment and treatment by irradiation of uterine bleeding should be in the hands of the man of surgical and preferably gynecologic training, as he is far better fitted properly to differentiate those cases which are better treated by irradiation from those which should be operated upon than one whose interests are wholly in the radiologic field.

The gynecological surgeon who does not utilize either surgery or radiotherapy, as the individual case may require, can scarcely give women who suffer from benign hemorrhage all that the present resources of modern medicine entitle them to demand.

CONCLUSIONS

1. The maternal possibilities of the patient must always be kept in the foreground, hence irradiation is of greatest value in women over forty. In younger women indications should be quite clear.

2. In the presence of pelvic infection, past or present, radium should not be used.

3. The larger fibroids are better removed surgically. In small bleeding fibroids in women over forty, radium is a valuable therapeutic agent. We prefer to restrict radium therapy to fibroids not over the size of a two and a half to three months' pregnancy.

RESUSCITATION IN ABDOMINAL SURGERY*

BY W. WAYNE BABCOCK, M.D., PHILADELPHIA

CHILLING to the very marrow of the surgeon's soul, is the evidence of a fatality on the operating table. Usually unexpected, the event is of dramatic and startling suddenness. The strong pulse and increasing blood pressure of the oncoming asphyxia has lulled the anesthetist to a false sense of security. The surgeon, noting the darkening color of the blood in the wound, has been reassured as to the excellence of the pulse; the continuing respiratory movements are observed with satisfaction, while the lessening movement of tidal air does not attract attention. Suddenly, it is found that the respirations have stopped, the pulse is reached for but cannot be felt, the color of the face has faded from the purple of cyanosis to lividity and to ashy gray. The pupils dilate widely, and the operator's hand, carried through the abdominal incision to the aorta and the left diaphragm, finds that the heart no longer beats. Panic seizes the operating staff,—“the patient is dead.” “But the pulse was so good a moment ago,” stammers the anesthetist. The patient is dead, but it is somatic death, and resuscitation is possible if the condition is not permitted to pass into molecular death.

Now comes the supreme test of operating room efficiency and morale. Hardly seven minutes remain before molecular changes in the cerebral cortex will make the death absolute, unless in the meantime the circulation is reestablished. Will the time be wasted in hypodermic injections which the stagnant lymph and blood will not move to the centers? Will ammonia, oxygen, amylnitrate be held before nostrils that no longer function? Will methods of artificial respiration be used without checking up their efficiency on the air movements, or precious moments be lost in dusting off a pulmotor, or in trying to start the machine with empty gas cylinders? Will the blood paths be distended by large intravascular injections without definite efforts to empty and energize the heart. Will the assistant and nursing staff fail to respond instantly, uncertain as to what should be done in the emergency? Will the operator delay, unnerved and hazy as to the best line of action? If so, the patient's life will probably slip through his fingers.

In schools, theaters, on shipboard, in electrical construction, in mines, special precautions are required against panic, fire, shipwreck and asphyxiation. Fire drills and boat drills and drills in artificial respiration are essential life-saving precautions.

*Read at a meeting of the Philadelphia Obstetrical Society, March 1, 1923.

Despite the constant danger to life, how many operating rooms hold emergency drills in resuscitation, or have printed and placed on the wall, the precise directions as to what should be done in such an emergency? Without a well drilled staff, with such a limited time in which to act, when the patient's heart stops beating during an operation, his life is in the greatest jeopardy. In such a great emergency, dependence on the operator's commands, on memory or the impulse of the moment, should be absolutely displaced by a systematic and time tested routine. Using the simplest apparatus, which should instantly be available, and in the most practical way possible, the efforts of the operating room personnel should be focalized for efficiency in the emergency. Three things are essential: First, the re-establishment of the circulation within seven minutes; second, the continuance of the tidal air movements in the lungs, without which the restored circulation cannot continue, and third, the maintenance of the temperature of the patient. The procedures used to accomplish these ends should not interfere one with the other. The Sylvester and Marshall-Hall methods of artificial respiration, we discard because they interfere with other measures to restore the circulation. Nothing should be done to prevent the anesthetist keeping in constant touch with the air movements and with the condition of the pulse. Nothing should be done to interfere with intravascular injections or cardiac massage. As a working plan, we would suggest the following:

Upon the order "RESUSCITATION," the patient is placed on her back with the arms extended and supported at the sides of the head.

1. The anesthetist supervises the position of the head, neck, the pupils and the temporal or carotid pulse. Especially does she maintain an unobstructed airway. She pries the jaws apart, if necessary pulls the tongue forward and by a delicate wisp of cotton affixed to the patient's nose, or by her ear, notes the degree and amplitude in any respiratory movements. These she reports to the operator as a guide to the efficiency of the artificial respiration, and she also reports any changes in the pupils or pulse.

2. *Assistant No. 1* immediately starts an intravenous injection in a convenient vein in front of the left elbow,—beginning with 200 mils of warm physiologic saline or Ringer's solution, to which ten minims of a 1:1000 solution of adrenalin have been added. Often $1\frac{1}{2}$ minim of adrenalin is ample and ten minims would violently strain the heart, so with the first evidence of a return of pulsations of the heart, he should instantly stop the injection by compressing the tube to prevent overstimulation, after which he only continues the injection from time to time, should it be necessary on account of a failing pulse. If the heart does not respond in the first 200 mils of solution, the injection is rapidly continued with successive additions of 15, 20, 30, or more

minims of the adrenalin solution, until a response has been obtained. The strong solution of adrenalin may be dropped into the funnel of saline, or for a more drastic and violent action, injected by a hypodermic needle through the rubber tube close to the intravenous needle, as suggested by Crile. This Assistant should be classed as inefficient if he has not introduced 50 mils of the solution by the end of three minutes, and dangerous or homicidal if he has not properly introduced the needle by the end of five minutes. He should realize the great need of both precision and haste and should not hesitate in the emergency to make a free incision through the skin, pick up the vein upon his finger and accurately introduce the needle into the lumen of the vein by sight.

3. *Assistant No. 2* assists the operator to produce artificial respiration, first by rhythmic compressions of the chest in and back and down. He faces the head of the patient, uses his hands and the inside of his elbows and forearms. His efficiency is reported by the anesthetist. He is classed as inefficient if his efforts do not produce audible air currents which strongly actuate the wisp of cotton upon the patient's nose, or if he causes more than sixteen respiratory movements per minute, or fails to allow sufficient time for inspiration. If, through rigidity of the chest of the patient, or other cause, the compressions fail to move the tidal air, he is warned by the anesthetist, and without further delay he immediately passes to the head of the patient upon the right side, places a piece of gauze over the patient's mouth, compresses her nostrils, and quickly filling his own lungs to the utmost, produces mouth to mouth insufflation, giving time for the air to escape between insufflations, while by pressure over the upper abdomen, the air is prevented from distending the stomach. In children, care should be taken not to overfill the lungs. The use of the pulmotor or similar mechanical appliances in infants has been responsible for deaths several days later from the rupture of the walls of the aveoli of the lungs.

4. *The Operator*, who has noted the absence of pulsation of the aorta and heart, carries his hand well up under the left diaphragm, and with the opposite hand over the chest, compresses the heart between the two hands. About twenty or thirty compressions a minute should be used, the heart being well compressed and emptied and quickly released. The efficiency of the massage is shown in the vessels of the neck. Often the massage will produce no response until a sufficient quantity of solution has been introduced into the veins to carry the adrenalin through the heart into the coronary arteries. Cardiac massage stimulates the organ, relieves overdistention, first emptying the old blood from the heart, and then permitting the adrenalin solution to pass to the coronary vessels. With the first pulsa-

tion of the heart, the beats usually rapidly increase in rapidity and speed, and, as a rule, no further efforts at massage are necessary, provided the respirations are well maintained. If the heart is so large or so dilated, or in such a position that effective cardiac massage is impossible, and no response has followed, the injection of 500 mils of fluid with 4 mils of strong adrenalin into the veins, thoracic massage or direct injection of the heart should be used. The author's method of transthoracic massage, which is almost instantaneous, is by a stab one inch long through the third left intercostal space, one inch to the left of the sternum. The index finger follows the knife through the chest wall and partially circles the left ventricle and is so hooked as to rhythmically compress the heart against the overlying wall of the chest. To prevent pneumothorax, wet gauze is wrapped around the base of the finger and is held over the opening when the finger is withdrawn. Other measures failing, avoiding the internal mammary artery lying 12 mm. lateral to the sternum, three to sixty minims of strong adrenalin solution may be injected by a fine long needle directly into the cavity of the left ventricle.

Nurse No. 1 brings the tray, (sterile and always held in readiness) containing a small funnel to which is attached four feet of soft rubber tubing, a suitable connection and a needle for intravenous injection; a scalpel, a ligature and thumb forceps, a dropper and reliable solution of adrenalin and a hypodermic syringe with a short and long fine needle. She supports the patient's right arm while the needle is being introduced and aids in the injection. This nurse is rated as inefficient if the apparatus is not complete, in good order, and available fifteen seconds from the time of the order.

Nurse No. 2 brings the sterile warm salt solution, fills the funnel and sees that the air is expelled from the tubing. This nurse should be rated as inefficient if the warm solution and the necessary paraphernalia are not at hand and ready for use within one minute from the time of the order.

Fist percussion or compression over the precordia, or sudden inversion of the patient, often starts the heart without resort to cardiac massage. With the elastic chest walls of children, cardiac massage is rarely necessary. Irregular cardiac contractions, tremors, fibrillation, usually indicate a hopeless condition.

Every person in the operating room should be checked and made to realize a personal responsibility for the patient's life, and those who fail to develop a dependable efficiency, should be weeded out. The operator should also prepare himself for the possible emergency by familiarizing himself with the feel of the heart through the left diaphragm and with the manner in which it can be best compressed. Tomorrow, during an abdominal operation, and without previous warning, order an emergency intravenous injection, and rate your operat-

ing room efficiency by the time that it takes to introduce 500 mls of saline solution into a vein at the temperature of the body. My personal experience illustrated by the following cases, shows the tragic seriousness of not being prepared or efficient.

Deaths from delay in not introducing adrenalized saline solution.

1. Somatic death under nitrous-oxide-oxygen anesthesia for simple hysterectomy in a patient of twenty-eight.—Delay of ten minutes in making the intravenous injection. No response to subdiaphragmatic cardiac massage until the adrenalized solution began to flow freely into the vein, when there was immediate resumption of heart action. Respiration restored later by rhythmic compressions of the thorax. Secondary generalized tonic convulsions from degeneration of the cortex, a result of the prolonged cerebral ischemia ending in death about sixteen hours after the operation. No other known reason for the death than the delay in restoring the circulation.

2. Somatic death under stavaine spinal anesthesia during hysterectomy for a very large fibroid in an obese colored woman of thirty-eight. About twenty-five minutes consumed in starting the intravenous injection, after which the heart immediately responded to massage. Attempts at artificial respiration by compression of the chest, ineffective. Respiration established after thirty-five minutes by forced insufflation through a tracheotomy wound,—death two days later without return of consciousness as the result of the cortical degeneration.

If the adrenalized solution had freely entered the veins within five minutes of the heart failure, there is every reason to believe that these two lives would have been saved. The common causes for delay in the intravenous injection include the following:

Apparatus not sterile or ready for use. Needle occluded or too small, too large or having a bad point. Poorly fitted or leaking connections, old or obstructed rubber tubing. Saline solution not ready, too hot or too cold or containing flocculi or precipitate. Adrenalin solution oxidized, decomposed or inactive. Absence of scalpel and forceps.

Failure to enter the lumen of vein, or vein transfixed, the injection passing into the adjacent soft tissue or leaking from wound. Delay after repeated attempts to introduce the needle by simple puncture to freely expose the vein, lift it up and to accurately enter a needle into the lumen. This is a common cause for delay even with fairly experienced surgeons.

In the second case after a number of attempts to inject veins in both arms, it was found that the vein had been transfixed and the solution was dripping from the wound.

Death from Imperfect Cardiac Massage. Case 3. Simple appendectomy under ether anesthesia in a patient of twenty-eight. Intravenous injection started in three minutes, while attempts at subdiaphragmatic cardiac massage were also made. No response in ten minutes—when it was evident the Assistant had been massaging the liver or some other organ, as we found that two actual compressions of the heart restored the circulation. Respirations later restored by compression of the chest—no return of consciousness, and death four or five hours later, a result of

the cortical degeneration. In this case there is every reason to believe the patient would have lived had the heart been properly massaged.

Death from Inefficient Artificial Respiration. Case 4. Operation under spinal anesthesia by stovaine for gangrenous cholecystitis and upper abdominal purulent peritonitis in a woman of about forty. Heart action restored after intravenous injection of adrenalized saline. Attempts at artificial respiration blocked by regurgitation of an enormous quantity of fluid from the stomach. Attempted insufflation by the Meltzer-Auer method seemed to do more harm than good. The heart continued to beat for fifteen or twenty minutes, the patient dying from our failure to restore the respirations. In such a case of regurgitant vomiting, an emergency tracheotomy should be instantly considered to prevent the patient being drowned by her gastric contents.

In a number of instances, we have been able to restore the circulation, but the usual efforts for artificial respiration have failed to produce movements in the tidal air. In at least two of these patients, life was saved by mouth to mouth insufflation, while had we continued on the efforts at artificial respiration by compressing the thorax without carefully watching for movements of the tidal air, both of these patients would have died on the table.

There are certain patients who have such advanced molecular changes at the time of operation that all resuscitative measures fail. Patients nearly moribund from sepsis, old age, advanced chronic degenerative changes and severe shock. Recently we attempted resuscitation in an elderly, starved and toxic man, who for two or three months had had an obstruction of the colon from carcinoma. In this patient there was no response to thirty mls of 1-1000 adrenalin solution promptly administered intravenously or to subdiaphragmatic cardiac massage. The injection of two mls of strong adrenalin solution directly into the left ventricle with direct massage of the heart through a thoracostomy wound only produced feeble fibrillary contractions of the heart. Of course, such patients are hopeless, but in the average case of somatic death during an operation, a few minims of adrenalin solution properly given in association with the other measures mentioned, will restore powerful cardiac contractions. As a rule, when the circulation is restored within seven minutes of the time of its cessation and efficient artificial respiration given, the patient will recover with little evidence of the danger through which he has passed except, possibly, a sore arm and a sore chest.

THE INCIDENCE OF CERVICAL EROSION FOLLOWING NORMAL CHILDBIRTH AND RESULTS OBTAINED WITH THE DICKINSON METHOD OF TREATMENT*

BY WM. KERWIN, M.D., ST. LOUIS, MO.

ALL of us who are in the habit of making routine postnatal examinations are struck by the frequent occurrence of cervical erosion following normal delivery. Attempts to correct the condition by chemical applications are met with few successes. It was this fact that prompted the popularization of the Sturmdorf operation, which, while successful so far as the erosion is concerned, leaves the patient frequently with a distorted cervix, and subjects her to a surgical procedure, which necessitates hospital care.

At the St. Louis Municipal Prenatal Clinics I have at my disposal a vast amount of material on which I could study the frequency of erosion in women who delivered spontaneously.

Since January 1, 1922, we have made observations on 102 cases delivered through our clinic, and have found that 21 women who delivered themselves spontaneously showed a marked cervical erosion, ranging in size from a nickel to that of a half dollar, and all having a profuse purulent discharge.

As a contributing factor in the etiology we did not attempt to rule out gonorrhea, but Wassermanns are the routine in our clinic, and only three of the 21 cases show a two-plus or more, reaction.

It was interesting to note that out of 51 white women 18 showed erosion, while in 51 colored only 3 presented the picture. This probably could be explained in the same way that colored women in general have fewer of the common postobstetric sequelae. As you all know lacerated and relaxed conditions in the colored women are the exception, while in the white they are rather the rule.

The pathology of erosion was well described by Eden at the Chicago meeting of the American Gynecological Society in 1920. He holds that in cervical erosion the columnar epithelium proliferates and grows out to destroy the squamous epithelium, which normally covers the vaginal side of the cervix. He sees in the erosions the danger of a precancerous condition.

Because of this danger and the symptoms attending erosion it becomes our duty to cure all erosions encountered.

Since reading Dickinson's article which appeared in the December (1921) number of the *American Journal of Obstetrics and Gynecology*,

*Read before the St. Louis Gynecological Society, March 10, 1922.

on the treatment of cervical eversion we have felt greatly encouraged in the attempt to cure erosions.

In general four methods of treatment are in use: (1) The application of chemicals, which is wholly unsatisfactory; (2) the application of radium, which at present is impractical in the hands of most of us, and attended by danger in some instances; (3) surgical treatment, which necessitates hospital care, and (4) Dickinson's cautery knife, which is both simple and satisfactory.

The Dickinson treatment consists in making rather deep cuts on the anterior and posterior surfaces of the cervix, extending from the internal os to the outer margin of the erosion. His technic is described in detail in the paper cited above and I need not go into further description here.

My experience with the method has been obtained in the treatment of 12 cases, six of them erosions with profuse purulent discharge, and six cases of endocervicitis, with the same symptom. The treatment is painless. The cases reported back at the end of a week, and in all there was a marked change in the character of the discharge, it being watery and profuse, instead of thick and purulent, as before treatment. The erosion was already disappearing and was on the whole smooth instead of granular. In some cases a necrotic plug was seen lying in the cervical canal. This was not disturbed, for on the second visit, a week later, the plug was almost cast off. At the end of the first week there could usually be seen islands of squamous epithelium growing towards the external os. These resembled in appearance the islands of new skin growing over a granulating wound.

A second application of the cautery was made at the end of the second week and in practically all of the cases the second application cured the erosion. In the cases of endocervicitis one application usually sufficed. It was interesting to note the effect on a lacerated cervix with eversion. The retraction of the scar infolded the margins and gave the appearance of a nulliparous cervix.

A typical case of the first group is the following: An erosion the size of a half dollar with a profuse blood tinged purulent discharge, in a woman with a child of six months, was treated January 31, with two anterior and one posterior incision. On February 7, the erosion was practically healed, and the discharge watery. On February 14 the formerly eroded cervix was smooth and showed islands of squamous epithelium projecting to within the external os. Two lateral cuts were made, and on February 28 the cervix appeared entirely normal with no signs of erosion or discharge.

A typical case of the second group was that of a woman, five months postpartum, whose cervix showed no erosion, but there was a thick discharge and eversion due to a laceration. Anterior and posterior

incisions were made on February 9. On February 14 the discharge was profuse and watery, a necrotic cervical plug was present. On March 6 the cervix appeared normal with no discharge and it was no longer possible to see the former scar that had existed.

SUMMARY

1. Cervical erosion occurs in 20 per cent of women going through normal childbirth. 2. Every cervical erosion should be treated. 3. Cervical erosion can be cured. 4. The cautery knife treatment is simple, quick, painless and satisfactory.

LISTER BUILDING.

THE DIAGNOSIS OF BORDERLINE OBSTETRICS

BY GEORGE CLARK MOSHER, M.D., KANSAS CITY, MO.

OBSTETRICS has for centuries been the Cinderella in medicine because its practice has not, heretofore, been limited. But whether in the hands of the ignorant midwife, or used by the embryo in the specialties, as an expedient, or accepted by the general practitioner as a routine part of the day's work, it has not, until the last twenty years, taken its place as a distinct art demanding the full time of its devotees as a dignified profession.

To this situation more than any other, must be ascribed the melancholy fact that morbidity and mortality in childbirth have not lessened and that year after year we are told that 16,000 prospective mothers in this country annually go down into the valley and never return, and that 250,000 infants are sacrificed during the first year of life.

These shocking revelations do not spring from the service of the obstetrician but are compiled from the figures covering the census returns of the whole country. And on their account the United States still holds its unenviable place as seventeenth among the nations of the earth instead of standing at the top of the list.

In this one department of diagnosis alone, time is bound to verify or to dispute the opinion of the oracle, and that is the question as to whether a woman is pregnant or not.

The embarrassment to the examiner when the result demonstrates itself and it does not coincide with the expressed verdict may be only personal, or it may be disastrous to the patient; indeed, there may be much dependent on the outcome of the examination.

One point in connection with the diagnosis of pregnancy under average normal conditions is that the patient herself has already reached a conclusion, and her physician may or may not be consulted to corroborate her view.

With the subjective and objective symptoms set plain, there is little difficulty in the diagnosis, for, to use but the one symptom in the development, to the married woman, ordinarily healthy and during the child bearing period, the suppression of the menses is the invariable sign of pregnancy, and this suspicion is generally verified later on.

The woman who marries late, or the wife who has been sterile, after having been married a number of years, finds herself in doubt as to her menstrual health as the age of menopause approaches; or the woman with abdominal pain or enlargement, in whose mind the question of tumor arises, these are the typical cases which usually comprise the list causing grief in their interpretation.

The differential diagnosis as between normal pregnancy and ectopic gestation, fibroid or cystic tumor, under these circumstances is often difficult and may baffle the most expert, certainly, is apt to be the Waterloo of the inexperienced.

The following instances of surprising error in the differentiation of cases, selected from those coming under my personal observation during the past few months in consultation, lead me to believe that much good may follow the discussion of the subject of borderline obstetrics, whether of early pregnancy, or of dystocia in labor.

A woman, aged thirty-nine, who was nervous and disturbed because of the suppression of the menses since January, presented herself for examination in May. She had a daughter, aged thirteen, and no subsequent pregnancy. Owing to insomnia, nausea, suppressed menses and a chain of symptoms of neurosis, she had consulted a diagnostician in March. After an examination she was assured that all the pregnancy she had was in her head. A month in bed in the hospital, with milk diet and massage, would cure her neurasthenia and she would be well. According to her history she had only one pelvic examination and that during the first interview, a part of a complete physical examination which had been made at that time. Having the advantage of two months in my favor, the development of the fetus itself disclosed the real condition of the patient. All worry cleared up, symptoms disappeared and a normal pregnancy has been under observation, to be terminated in September.

A multipara, aged thirty-eight, married one year, consulted me in June and presented a history of nausea and suppression of menstruation and of having been under treatment by a stomach specialist who had made no pelvic examination, but after test meals, had given her lavage for two months on account of intractable vomiting. This proved also to be a case of pregnancy, and will be delivered probably before this paper is read.

A woman from a near-by college town, the wife of one of the faculty, had been under observation for four months by an internist, who had diagnosed pregnancy. As eight months had elapsed when I saw her, the tumor showing but little change, the diagnosis of right ovarian cyst was made without difficulty, and the diagnosis was verified by operation and removal.

Two cases of laparotomy following a diagnosis of ectopic gestation which proved each to be intrauterine pregnancy, and an operation for fibroid uterus, which was found to be a normal pregnant enlargement, have come under observation during the summer.

These are spectacular exhibits, but not remarkable but for the fact that the condition might have been cleared up by obstetrical consultation.

Now there exists a furore for cesarean section over the country. This is a deplorable situation. In every county seat surgeons are doing abdominal delivery, although they have had little or no experience in pelvic measurements, or, at least, without giving the patient the benefit of employing them, or with no calculation of the comparative relation of passage and passenger, and for no better indication than occiput posterior positions, or other delayed labor. We hear of forty cesarean sections in one clinic, or one hundred in an-

other, in one year, and we are appalled at the temerity of such interference with a physiologic process.

Rudolph Holmes' prediction that obstetrics is becoming a lost art seems about to be verified unless we can swing the pendulum back to a normal perpendicular.

In Kansas City three of the most capable surgeons have long made it a rule to do no cesarean section without the opinion of an obstetrician. Since the approximate size of the fetus can be so nearly determined by means of the measurements of McDonald, Ahlfeld, or Paret, and the pelvic capacity can be demonstrated by routine examination, there can be no argument as to the right of the patient on whom the section is contemplated, to have every safeguard thrown about her, before resorting to a major surgical operation, when Nature may be competent to terminate her problem *per vias naturales*.

There are a few internists whose skill is so paramount that they can cover the field of the entire human body with equal and unerring accuracy, and while in the diagnosis of problems affecting the organism in general their work may be most commendable, they are apparently not infrequently apt to fail in the appreciation of the physiology and pathology of the pelvis.

And since the woman of today so seldom exhibits a perfectly normal anatomy, the surgeon who considers doing an operation where the question of pregnancy is involved, is wise when he has availed himself of the best judgment of the obstetrical or gynecological expert in his community.

1100 GRAND AVENUE.

NEPHROLITHIASIS AND PREGNANCY

BY AIMÉ PAUL HEINECK, M.D., CHICAGO, ILL.

DURING pregnancy, the proper and adequate functioning of the kidneys is of paramount importance. During gestation, lesions affecting the urinary organs assume a particular importance and interest. It is conceded that normal pregnancy plays an important rôle in the etiology of calculi, both large and small; therefore, the disturbances of nutrition incident to lactation, and the superalimentation necessitated by, and accompanying, gestation, are factors which must not be disregarded.

During pregnancy, the kidneys are abnormally taxed by the secretory load consequent to increased metabolic activity and to elimination of fetal and maternal waste products, and are, in addition to the ureters, also subjected by the gradually increasing pressure of the gravid uterus to abnormal physical conditions. During pregnancy, the skin is less active than normally; it excretes less; the pregnant woman's physical condition is one of decreased resistance. Such direct factors as the aforementioned and others acting indirectly as sluggishness of the bowels and consequent constipation, not uncommonly observed during pregnancy, can easily impair normal kidney efficiency and can and may provoke renal disturbances even in the absence of pre-existing or predisposing renal lesions. Therefore, it is conceivable that a kidney, the seat of disease, may be further impaired, functionally and anatomically, during and by the pregnant state.

If only one kidney be affected, the organism may and usually does accommodate itself with the sound kidney; but during pregnancy, the sound kidney alone may fail to adequately eliminate the combined waste products of mother and fetus; signs of toxemia may appear. It must then be decided upon the conditions presented by each individual case, whether a woman with a known kidney lesion, is to be allowed to undergo the risks of pregnancy with the added strain which it throws on the kidneys. If a renal calculus or calculi are present, the medical attendant must determine whether its coexistence with the progress of pregnancy is permissible in the interests of mother and child; and should these interests demand it, what operative measure is called for. On one hand, there is the certainty of increased work for the kidneys, with a possibility of their failure to accomplish it; on the other hand, while the risks arising from

operation may to a large extent be eliminated, and are, in a sense, minimal, yet operation offers no positive guarantee that urinary secretion will be increased. Pregnancy demands efficient kidney functioning. If renal lithiasis be present and operative relief is clearly indicated, we must know how operative intervention will affect the existing pregnancy, and whether it will in any way incapacitate the woman in the event of a subsequent pregnancy or pregnancies.

In this paper, the special kidney lesion I wish to discuss is nephrolithiasis. In its etiology, renal lithiasis is intimately related to food ingestion and food utilization. Excessive, insufficient, or unsuitable foods and metabolic disturbances are factors that at once affect the blood; by hampering the eliminative functions of the kidneys, they predispose to urinary retention and calcareous deposits.

In considering nephrolithiasis as affected by pregnancy we have two main questions to deal with: First, nephrolithiasis complicating an existing pregnancy; secondly, whether a pyelotomy, nephrotomy, nephrectomy, or other surgical operation done for lithiasis jeopardizes the health or life of mother or fetus in the event of a subsequent pregnancy. Our conclusions are based on a somewhat exhaustive analysis of cases reported in the literature, and on our own personal clinical experience.

Renal calculi are not commonly met with in pregnancy principally because they are not common in the female sex. When renal calculi are present with or without infection, antenatal treatment is necessary because, the additional renal activity provoked by pregnancy favors increase in size and number of such calculi as are present. (Marion [8]). The indication is to relieve the kidneys and the organism from any toxemia due either to deficient renal elimination, or to infections processes present in the kidney itself, or to both of these causes. This can be partially effected by hygienic, dietetic and medicinal measures. If the stone be small, efforts to secure elimination through the natural channels are occasionally successful. If the calculus be in the pelvis and the parenchyma not or but slightly injured, a simple pyelotomy suffices. If there is but one stone in the kidney, a pyelotomy or a simple nephrotomy with a small incision may suffice. But, if the lesion be severe, if the stones be multiple, branched, coral-shaped, etc., a nephrotomy or even a nephrectomy may be indicated. The failure of palliative measures, the severity of the symptoms presented by the patient, the nature and characteristics of the calculi, the extent and nature of the associated lesions, the anatomical state of the affected kidney or kidneys, and the patient's general condition, give the indications for operation and for the type of operation to be performed.

When the patient's other kidney is in good functioning condition, unilateral lithiasis usually does not (in the absence of severe symptoms or advanced degenerative changes in the calculous kidney) seriously complicate pregnancy or labor; but with bilateral lithiasis, the conditions of kidney functioning are usually such as to demand operation. Braasch¹ states that 12 per cent of nephrolithiatic cases are bilateral. In bilateral nephrolithiasis, it is desirable, if possible, that both kidneys be saved; a patient never has too much renal parenchyma. The kidney with the best functioning should be operated on first and the other kidney, some weeks later if conditions be favorable. Some operators of wide repute advocate simultaneous operation on both kidneys. After kidney operations for removal of calculi, when the associated infection is slight, drainage of the renal pelvis, parenchyma or perirenal tissues may be omitted, but, generally, post-operative drainage is indicated; it aims to protect the kidneys from further disastrous effects of the infection and enables the organism to better withstand and overcome toxemia.

Even though urgent symptoms be absent, calculi occurring with bilateral pyelonephritis must always be removed. The same indication obtains in cases of multiple calculi. In the presence of calculous anuria, immediate operation is imperatively indicated. Very large calculi, especially if branched, coral-shaped, etc., cause so much tissue destruction, that ordinarily nephrectomy is called for.

While it should be the general rule not to subject pregnant women to the shock of major operations, one must not overlook the fact that during gestation, the prognosis of kidney operations is largely subordinate to the state of the affected or unaffected kidneys. The tolerance of even advanced pregnancy to major operations is well known, and it will be shown that if the necessity for such an operation exists, pregnancy in itself, within certain limits, is not a contraindication. Operations for nephrolithiasis do not unfavorably influence the evolution of pregnancy or in any way disturb delivery or the puerperium. This is all the greater reason why operative relief should be sought when other means fail to bring about the desired result in regard to kidney-efficiency, removal of toxemia and cure of the latter's source.

Operative relief being indicated, it is necessary to determine as accurately as possible the functional value of the kidneys. For this, both cystoscopy and ureteral catheterization are useful procedures. In obscure cases of suspected lithiasis, a pyelogram is a valuable aid for identification and definite localization of shadows; but pyelography has dangers in the hands of the unskilled. It should be employed only by one having had considerable cystoscopic experience, as well as numerous opportunities and facilities for observing patients

with renal or ureteral lithiasis. It is advisable that pyelography be restricted to cases which can be accurately diagnosed in no other way.

In choosing between pyelotomy, nephrotomy and nephrectomy, one is guided by the conditions found after exposure of the kidney and determination of its actual state by inspection. It should be affirmed at the outset, that pyelotomy is the operation of election, nephrotomy and nephrectomy being operations of necessity. Nephrotomy has dangers, chief among which is secondary hemorrhage. Even a perfectly regular nephrotomy with easy extraction of the calculus or calculi, can be followed by a postoperative hemorrhage severe enough to require a nephrectomy. In a nephrotomy, the incision should be almost invariably along the external convex edge of the kidney.

An associated pyonephrosis or hydronephrosis may necessitate a nephrectomy; the degree of destruction of the renal parenchyma and pelvis will decide. It is questionable whether it is worth while to save an organ having scant functional value and showing marked anatomical changes when a complete recovery can be obtained, by a comparatively safe operation. The existence of a pregnancy, if not advanced beyond the sixth month, does not affect the operative indications, as the gestation can continue its normal evolution uninfluenced, or only slightly so, by pyelotomy, nephrotomy or nephrectomy. All unnecessary trauma and manipulations are to be avoided, so as to impair as little as possible the local tissue resistance, prevent wound contamination and minimize operative shock.

Clinical and laboratory evidence of very low kidney functioning may contraindicate nephrectomy, especially if the symptoms are not very acute. In cases totally unsuited to operation, nonoperative measures, of necessity, must be employed. Cases of pregnancy with renal lithiasis have been carried to term with such treatment.

A search through the literature has brought to light a number of cases of nephrolithiasis complicating pregnancy. Only a few are reported with sufficient data to permit utilization in this paper. These, amounting to twenty-nine cases, are collected in Table A. A study of this table shows that sixteen cases were operated during pregnancy, the operation performed being a nephrectomy in three, a pyelotomy or nephrotomy in ten, one ureterotomy and in two cases the nature of the operation is not stated; ten cases were not operated; three were operated after the pregnancy; and in three cases, no particulars as to the course followed are given. Two of the three nephrectomized patients had normal labors with a living child at term; no complications are reported. The period of gestation in these two cases was 2 and 2½ months, respectively, at time of operation. A nephrectomy done at the fourth month of gestation was followed after a few

TABLE A
CASES OF NEPHROLITHIASIS COMPLICATING PREGNANCY

CASE NO.	REPORTER AND REFERENCES	AGE; PRIMIPARA OR MULTIPARA	UNILATERAL OR BILATERAL	CO-EXISTING PATHOLOGY	TREATMENT	RESULTS AND REMARKS
1	Tiffany, Medical News, Phila., 1887, vol. 50, p. 428.	27 years	Unilateral Left	History of pain in left kidney region for several years. Pus in urine, pus found in kidney 5 months pregnant. Pyelitis, probably calculous, diagnosed.	Kidney exposed; Nephrolithotomy; Calculus found well; pus in urine constantly diminishing. Movements of child not noticed more violent than normal at time of operation; no disturbances observed. Subsequent history not given.	Physiologically; pus in urine constantly diminishing. Movements of child not noticed more violent than normal at time of operation; no disturbances observed. Subsequent history not given.
2	Landau, Dent. med. Wehnschr., 1893, xix, 560.	Not given	Not stated	History of colicky pains for 2 years; 2 mos. preg. found full of calculi.	Nephrectomy; Kidney operation has given satisfactory results but no further particulars are given.	Operation has given satisfactory results but no further particulars are given.
3	Pou, Memphis Med. Jour., 1898, xviii, 359.	40 yrs., par-ity not stated.		Pregnant 8½ months; diagnosed renal lithiasis.	Potash salts and later lith-balsam copaiba nitr. spir. ether.	Third day, blood in urine. Later passed calculus and calculus. Delivered 60 hours later of healthy child. Good recovery.
4	Tucker, Cleveland Jour. Med., 1899, iv, 431.	30 yrs.; 5 para.	Unilateral; right.	History of bloody urine and pain for 9 yrs.; urine abnormal since last labor 6 yrs. ago; 2 mos. pregnant.	Lithotomy; 2 calculi removed from right kidney; 1 larger weighed 86 gr.	Subsequent history not given.
5	Gova, Ann. d. gines., 1903, xxv, 692-705, case I.	36 yrs.; 7 para.	Unilateral; left.	Pregnant for 2½ mos. Kidney calculus.	Nephrectomy.	Colicky pains first noted on left side at age of 27. Pregnancy went normally to term. Living healthy child which was nursed. Pregnant again 5 months later; living healthy child at term. No placental lesions in either case; normal puerperium.

TABLE A—CONT'D.

CASES OF NEPHROLITHIASIS COMPLICATING PREGNANCY

CASE NO.	REPORTER AND REFERENCES	AGE; PRIMIPARA OR MULTIPARA	UNILATERAL OR BILATERAL	CO-EXISTING PATHOLOGY	TREATMENT	RESULTS AND REMARKS
6	Lynch, Harrigan, & Surg., Gynec., & Obst., 1915, xx, 657-660.	35 yrs.		Pregnant 2 months; Nephrotomy for cal- culus. Kidney calculus.		Normal labor at term. No further par- ticulars.
7	Harris, Med. Jour. of Austraha, 1916, ii, 291-294.			2 cases of pregnancy Not stated. complicated by renal cal- culus; 1 case complicat- ed by ureteral calculus.		No further particulars.
10	Reder, Amer. Jour. of Obst., 1916, lxxiii, 66-77.			In a list of cases operated, mentions 1 case operated for renal calculus during pregnancy. No untoward influence on the pregnancy, which went to term. No further particulars.		
11	Malcolm, Lancet, 1917, London, 159-460.	1; para; ii not given.	age Not stated.	Pain in side for 7 years. Operated. Large cal- culus and several weeks after last labor, small ones removed urine bloody and right from kidney. kidney region hard.		Severe hemorrhage was the only important symptom of the condition.
12	Mussey, Collected papers of Mayo Clinic, 1917, ix, 293.	Not stated.	Not stated.	1 case operated during pregnancy for pyo- nephrosis with stone.		No other particulars given (in a series of cases).
13	Bugbee, Jour. to Amer. Med. Assn., 1918, lxxi, 1538-1541.			In a series of cases concerning renal complications of pregnancy, ureteral calculi observed in 2. In 1 case, the calculus was passed fol- lowing cystoscopic manipulations. In the other, the calculus was re- moved, the patient going to term. Age of pregnancy not stated. In 2 other cases in which renal calculi were noted, the patients were treated by pelvic lavage and pregnancy proceeded undisturbed to term.		

TABLE A—Cont'd.
CASES OF NEPHROLITHIASIS COMPLICATING PREGNANCY

CASE NO.	REPORTER AND REFERENCES	AGE; PRIMIPARA OR MULTIPARA	UNILATERAL OR BILATERAL	CO-EXISTING PATHOLOGY	TREATMENT	RESULTS AND REMARKS
17	Growell, Urol. & 25 yrs. Cutaneous Rev., 1918, xxii, 572-577.		Unilateral; Right.	Pain in right side for past 10 years; severe kidney shadow in right kidney; left, 4 mos. pregnant.	Large Nephrectomy. Large kidney, filled with pus, showed practically no kidney calculus.	Miscarriage 5 days later. Left hospital in good condition.
18	Mourke, Ann. Surg., 1918, lxxvii, 376.	21 yrs.	Unilateral; Right.	Right lumbar pain for past 10 months. Had child 2 months ago. Pain and high temperature, etc., for some weeks. X-ray showed numerous calculi in right kidney.	Perinephritic abscess opened; contained calculus; other calculi removed from kidney.	Uneventful recovery.
19	Davis, Jour. Med. Soc., 1918, xvii, 387-389.	42 yrs. 10 para.	Unilateral; Right.	History of urinary disturbance during previous pregnancies with soreness over right kidney; last pregnancy ended in miscarriage.	Operated for kidney calculus and abscess. Numerous calculi removed.	The history shows 2 miscarriages and 1 premature labor at 8 months.
20	Brausch, Collected papers of Mayo Clinic, 1919, xi, 262-267.		2 unilateral; 1 bilateral.	Nephrolithiasis complicating pregnancy.		During 1917-18, 2 cases diagnosed as renal lithiasis were not operated on account of advanced pregnancy. 1 case of bilateral nephrolithiasis with pregnancy was similarly postponed. The subsequent histories of these cases is not given.

TABLE A. CONT'D.
CASES OF NEPHROLITHIASIS COMPLICATING PREGNANCY

CASE NO.	REPORTER AND REFERENCES	AGE; PRIMIPARA OR MULTIPARA	UNILATERAL OR BILATERAL	CO-EXISTING PATHOLOGY	TREATMENT	RESULTS AND REMARKS
23	Bugbee, Amer. Jour. of Obst., 1918, lxxvii, 781-786.	Not stated.	Unilateral; Right.	Kidney pain during first pregnancy in 1911. Pain intermittent until 1914 when the calculus was removed. 11 calculi since passed spontaneously after catheterizations.		
24	Jeanbrau, Jour. d'Urol., 1921, xii, 361.	Not stated.		7 mos. pregnant. Woman in full puerperal septicemia from calculus pyonephrosis.	Woman pyelotomy.	Woman died very shortly after operation; general infection and uremia.
25	do.	Not stated.		2½ mos. pregnant. Calculi in kidney pelvis.	Lumbar pyelotomy.	Pregnancy uninfluenced.
26	do.	Not stated.	Bilateral	2 months pregnant; calculus in both kidneys.	cal lumbar ureterectomy.	Previous to pregnancy, right kidney operated for calculus. The left ureter was operated during pregnancy. Pregnancy proceeded without incident.
27	do.			In 3 other cases of pregnancy with symptoms of calculosis, no operation was done and the pregnancies ended normally at term.		
28						
29						

days by miscarriage. Five of the nephrotomized patients proceeded to normal labor at term and delivery of healthy children. In three cases, no particulars as to the labor are given. Of the two cases in which the nature of the operation is not stated, in one case, the patient went to normal labor at term, and in the other, no particulars are given. In the nephrotomies followed by normal labor at term, the age of the gestation at the time of operation varied from 2 to 7 months.

In these 29 cases with nephrolithiasis during pregnancy, the histories show sixteen children born normally at term; in eight cases nothing is stated with regard to the subsequent course of the pregnancy and labor; in four cases which were operated after the pregnancy, the history showed disturbances in pregnancy and labor in only one case. One case was treated by lavage of the renal pelvis and proceeded to term. Bugbee² remarks that catheterization of a pregnant woman is not difficult; a moderate amount of pressure may be required to advance the ureteral catheters, if there is torsion or kinking, which is more usual in the case of the right ureter.

In the one case of mishap (miscarriage) after a nephrectomy performed during the fourth month of pregnancy, the kidney condition was at least ten years old: the removed kidney was large and pussy, hardly any of its substance was left. The condition was frankly bad.

Schmidt³ collected 36 cases of nephrectomy performed on pregnant women for various pathological conditions including renal lithiasis. Of these, 4 were in the second month of gestation; 6 in the third month of gestation; 8 in the fourth month; 7 in the fifth month; 4 in the sixth month; 2 in the eighth month; and in the others the age of the pregnancies is not definitely stated. In seven cases, the effect on pregnancy is not stated.

In 1 case, the operation was done almost at the time of delivery; spontaneous birth with a living child occurred. In 2 cases, the patients died; 21 of the others had a normal labor at term; 3 had spontaneous abortion; 1 had induced abortion; 1 had induced labor; and 1 had a dead fetus extracted. In four cases, it is stated that harmful effects occurred as regards the fetus.

Schmidt is of the opinion that a nephrectomy performed during pregnancy, in cases in which a diseased kidney has influenced its mate, may precipitate eclampsia. He believes that pre-existing chronic disease of the kidney is a very important factor in the etiology of eclampsia. Eclampsia is not mentioned in any of the 29 operated or non-operated cases collected in Table A, of nephrolithiasis during pregnancy. In all cases, in which the puerperium was discussed, it was normal.

Clinical experience fully shows that in a woman otherwise a good operative risk, a pyelotomy, nephrectomy, or a nephrotomy done for nephrolithiasis during the early months of gestation, does not jeop-

ardize the life of either mother or child. It can be affirmed that if such an operation is indicated, its performance is safe and should not be delayed.

The question of the obstetrical future of women having but one kidney has given rise to much discussion, and in the literature relating to it, there is fair agreement in arriving at conclusions. Pregnancy in nephrectomized women occurs far more frequently than is reported in the literature, as the number of nephrectomies done on women within the age limits of sexual activity is considerable.

I have found in the literature 30 cases reported with sufficient data, in which pregnancy followed a nephrectomy or nephrotomy done for nephrolithiasis; these cases are shown in Table B. In three of these cases, the pregnancy occurred within a year of the nephrectomy; in one case, within two years of the nephrectomy, and in one case within three years. At least in two cases, the remaining kidney was affected. One of these women had three children after the operation; she later died from urinary complications. In one case, pregnancy occurred within two years following a nephrotomy. In 21 cases, the time of the occurrence of pregnancy following operation is not stated. In most of the cases, the pregnancies do not appear to have been modified in any way by the operation. When labor was difficult, the difficulty was due to some cause other than the operation. One case is to be excepted, in which the operative scar ruptured owing to the strong labor pains and a forceps delivery was performed in order to avoid a ventral hernia. In the cases therein enumerated, it is reported that 30 women on whom a nephrectomy or nephrotomy had been previously performed, bore 32 healthy children. From the histories, one sees that operation was not followed by any untoward incident of particular importance during the pregnancy, labor or puerperium. The cases therefore, bear the opinion expressed by Schmidt, Cova, Twyman, and other authors. Pregnancy, if not occurring too soon after a pyelotomy, nephrotomy or nephrectomy, is not hazardous, *providing the remaining kidney is not diseased*. If the remaining kidney is diseased, and not functioning properly, childbearing is dangerous to mother and child and is not to be recommended.

The cases recorded show that even when the remaining kidney is involved, the patient does not run any particular risks from the fact of pregnancy. The number of cases reported is small and too limited to justify a dogmatic opinion, but they appear to be the only ones recorded.

Cova⁴ collected 73 cases in which pregnancy followed a nephrectomy done for various conditions. In no case was there abortion or premature delivery; all cases went to term and evolved without any grave disturbances. If there was some albuminuria, it was never severe and never called for obstetrical treatment. In

some cases, subsequent pregnancies are recorded with equally good results. It will be seen that these are the results recorded generally in Table B, for nephrolithiasis. Nor does the development of the fetus appear to have suffered in any way.

Hartmann⁵ found records of 115 cases in which a nephrectomy or other major kidney operation done on women for various conditions (10 for lithiasis) was followed by pregnancy. In 74 nephrectomies, there were two deaths from eclampsia, 1 death from renal insufficiency, and 1 abortion. In 66 cases collected by Pousson⁶ in which nephrectomized women conceived, there were only 7 abortions; 13 of these women had subsequent multiple pregnancies. The infants were living and well at birth. In discussing the condition, Legueu⁷ thinks that in the absence of complications, pregnant women should not during pregnancy be operated on for kidney lesions. Marion⁸ thinks that women showing kidney calcuosis during pregnancy can be classified into two groups. First, those in which the calculus causes complications and which every one is agreed should be operated; secondly, those in which there is an absence of symptoms. In this second category, Marion distinguishes those at the beginning of pregnancy and for whom there is every advantage of preventing infectious complications. These can be operated without risk. In cases in which the pregnancy has passed the sixth month, events should take their course.

Matthews⁹ quite recently collected 265 labors occurring in 241 nephrectomized women. Only fifteen were complicated and there were but two deaths. Matthews concludes that after nephrectomy pregnancy follows its normal course and is but little more hazardous to mother or child than pregnancy under normal conditions, providing the remaining kidney is functioning properly. There is usually some albuminuria during the last weeks. If a severe "pregnancy pyelitis" occurs, the pregnancy should be terminated.

Hartmann's⁵ study of the literature leads him to conclude that the removal of a diseased kidney, does not exert any unfavorable influence on the development of future pregnancies, and that this operation does not expose the patient to interruption of pregnancy, any more than other major abdominal operations.

Kidney operations, during pregnancy, especially nephrectomy as it throws the entire urinary elimination on one kidney, have received considerable attention. It has been assumed, and verified at autopsies, that after a nephrectomy, the remaining kidney undergoes hypertrophy and is capable of doing additional work. Tridondani¹⁰ has discussed the loss of a kidney in pregnant women. He does not accept the belief that there is a sufficient compensative power in the remaining kidney simply by hypertrophy to deal with the excrementitious materials of the body.

Tridondani contends that during pregnancy venous stasis is induced in the kidney; first, by pressure of the enlarged and enlarging uterus on the renal veins; secondly, by engorgement of the abdominal vessels; and thirdly, by the fact that the uterine arteries during pregnancy draw off a large proportion of the blood from the kidneys. This venous stasis affects the nutrition of the glomeruli both by the increased amount of urea secreted and the irritation caused, and predisposes to albuminuria and other kidney complications of preg-

TABLE I:
CASES OF PREGNANCY SUBSEQUENT TO A NEPHRECTOMY OR NEPHROTOMY FOR LITHIASIS

CASE No.	REPORTER AND REFERENCES.	AGE AND PARTURITION OF PATIENT.	PERIOD ELAPSED SINCE OPERATION.	WHICH KIDNEY REMOVED.	REMARKS
1	Shepherd, N. Y. M. J., 1890, li, 723.	Age not stated. Multipara.	Nearly 3 years.	Left.	2 Years after the left kidney had been removed, urine from right kidney contained pus. This was much increased when seen a year later. She had been confined 10 days before and urine was now very scanty. Died. Right kidney found at autopsy to have a large pus cavity with a calculus. 3 children have been born since removal of the left kidney.
2	Haraiewicz, Przegl. Chir., 1894, 5, ii, Abstracted Rev. de Chir., 1898, xviii, 275.	Not Stated.	2 years.	Right.	Retrodeviation of uterus, parametritis and endometritis occurred after the nephrectomy. At 7th month of pregnancy, uterus fixed to the right. No albuminuria. Labor normal at term.
3	Twyman, Brit. Med. Jour., 1898, i, 423.	32 years 7 months. Multipara.		Left.	Suffered no more than in previous pregnancies except that morning sickness was more severe. At labor, during unusually strong pains the placenta ruptured, and to prevent a ventral hernia the woman was delivered by forceps. Some albuminuria. Puerperium regular. Child healthy. Mother made good recovery.
4	Maberly, Brit. Med. Jour., 1898, i, 601.	Age not stated. Primipara.	2 years.	Left.	The right kidney showed signs of being affected shortly after removal of the left. Craniotomy had to be done in this case on account of general contraction of the pelvic brim; one week later she had slight convulsions, but made a good recovery. This woman again became pregnant and labor was induced at 250th day and she gave birth to a living child weighing 3½ lbs. Mother and child well, but she still shows pus in her urine.

TABLE B.—CONT'D.
CASES OF PREGNANCY SUBSEQUENT TO A NEPHRECTOMY OR NEPHROTOMY FOR LITHIASIS

CASE No.	CASE REPORTER AND REFERENCES.	AGE AND PARTY OF PATIENT.	PERIOD ELAPSED SINCE OPERATION.	WHICH KIDNEY REMOVED.	REMARKS
5	Cova. Ann. di ostet. e ginec., 1903, xxv, 692, 705.	Age not stated. para. 5.	5 months.	Right.	Woman had suffered from calculous kidney disturbances for several years; 4 of 5 previous pregnancies ended regularly at term; the last ended spontaneously at fifth month. During the present pregnancy, feeling of malaise on right side aggravated the pain radiating down the ureter. There was some diminution of urine; this was treated and the amount increased. Some albuminuria. Labor at term. First period protracted to 36 hours. Child born spontaneously in good condition. Secundines and puerperium normal.
6	Hartmann, "Travaux de Chir.," Paris, 1913, iv, 459. And Ann. d mal. d. org. gen. urin., 1911, xxix, 98.	26 years.	1 year.	Not stated.	Nephrotomy for calculous pyonephrosis. Normal pregnancy and birth at term. Child nursed by mother; 2 subsequent normal pregnancies at term. Then nephrectomy which after 3 years was followed by a normal pregnancy and labor at term.
7	do.	30 years.	4 years.	Not stated.	Nephrotomy for calculous pyonephrosis. Child born at 7th month and lived only one hour.
8	do.	31 years.	3 years.	Right.	Nephrectomy for calculous pyelitis; pregnancy normal; birth at term; child nursed by mother.
9	do.	Not stated.	1½ years.	Not stated.	Nephrectomy for calculous pyonephrosis. Pregnancy normal; birth at term.
10	Ponsson Ann. d. mal. d. to Org. gen. urin., 1911, 19 xxix, 103.			Not stated.	States that of 66 collected cases of nephrectomized women who subsequently became pregnant 10 had been operated for lithiasis. In only 1 case was there a miscarriage. In the 9 others the pregnancy proceeded normally to term, although in some cases the remaining kidney was much altered.
20	Pollak, (Centralbl. to Grenzgeb. d. Med. u. 30 Chir., 1908, xi, 449.				Saw 11 cases of normal pregnancies after nephrectomy for calculi or pyonephrosis.

nancy. Tridondani thinks that renal venous stasis is compensated by hypertrophy of the left ventricle of the heart and that the danger arising from the kidney is obviated in pregnant women with a sound heart. These views have been assailed by Twyman¹¹ and others who think that there is no anatomical support for them. Twyman thinks that the safety of the woman pregnant after a nephrectomy does not depend on hypertrophy of the remaining kidney alone, but in an increased action of all the emunctories of the body. *If the remaining kidney is diseased*, pregnancy subsequent to a nephrectomy is dangerous for both mother and child. It should be avoided.

Whatever be the correct facts regarding the elimination of waste products during pregnancy, statistics support the view that a nephrectomy for any cause prior to any pregnancy is not a particular menace to the latter's evolution, and threatens neither the maternal nor fetal life. The loss of a kidney does not appear to unfavorably influence pregnancy, nor does pregnancy appear to put any strain on a nephrectomized woman that it does not put on a non-nephrectomized woman. The clinical facts do not show that a woman with but one kidney, whether it be in a perfectly sound condition or not, runs a much greater risk by becoming pregnant than in the ordinary course she would run from such kidney condition. A woman with one healthy kidney does not, as far as the facts show, run any more risk from pregnancy than does the woman with two kidneys.

Schramm,¹² one of the first to study this question, advised that for fear of eclamptic convulsions it was not safe for a woman with but one kidney to undergo the risk of pregnancy. This opinion is not justified by the facts reported in operations since then carried out. There is always a possibility or perhaps even a probability, of some damage and risk when elimination must be entrusted to one of even two normal kidneys at a time when there is abnormal production of excrementitious matter, and an unusual degree of risk of lesion to the organ. But it is probable that other agencies during this time take up the work of elimination. Roger¹³ has recently shown by experimentation that the lungs, in addition to their purely respiratory functions, have a de-toxicating action and can aid other excretory organs in the conversion and elimination of poisonous substances. From a study of the literature, I can say that there should be no hesitation in permitting a nephrectomized woman to marry or run the risk of pregnancy if she has one good functioning kidney, and this is especially true if the nephrectomy has been done for nephrolithiasis. Sufficient time should be allowed to elapse after the operation to permit the woman's kidney functional capacity to be certified as regards sufficiency.

The general conclusions to be drawn from a study of the subject are:

(A) *As regards nephrolithiasis during pregnancy:*

(1) If the condition be latent or if the symptoms be not severe, palliative measures are to be instituted and the pregnancy permitted to proceed; large amounts of water should be given per mouth and urinary antiseptics—urotropin, acid sodium phosphates, etc., prescribed. After pregnancy, the patient should seek operative relief and cure.

(2) If the symptoms are severe, a pyelotomy, nephrotomy or nephrectomy, if not contraindicated for some other reason, may be done with safety to both mother and child up to the sixth month of pregnancy. Careful consideration should be given to number, size, location and characteristics of stones before operating. Good functioning of the remaining kidney should be insured if nephrectomy is to be done. The operative indications for nephrolithiasis during pregnancy are the operative indications for nephrolithiasis in general. With even one kidney functioning approximately normally, the freezing point of blood and urine is about the same but with a diseased solitary kidney, the increasing concentration of the blood, and hence lower freezing point may be the signal for the induction of abortion.

(3) If a major operation for kidney calculus has to be done later than the sixth month of pregnancy, there is the possible danger of premature termination of the pregnancy. An operation done later than the sixth month of gestation, exposes the parturient woman to an interruption of the pregnancy.

(4) Gestation occurring in a nephrectomized woman calls for watchful preparedness. The development and persistence of serious symptoms may call for the induction either of abortion or of premature labor.

(5) In any given case of nephrolithiasis, the question whether to operate or not is to be carefully weighed by the surgeon; judging the operative risk, the favorable effect which a successful operation has upon the pregnancy, the bad effect of continual toxemia and pus formation on the fetus, the dangers incident to the binding of the pregnant uterus by the formation of adhesions, and the fact that such may markedly impede labor. The fact should be kept in mind that a kidney calculus is more troublesome and dangerous during pregnancy than otherwise, owing to the existing greater kidney activity. The age of the pregnancy is not to be disregarded.

(B) *With regard to pregnancy occurring after nephrectomy:*

(1) The nephrectomized woman may be permitted to marry, or if married, to undertake the risk of pregnancy, provided she is in other-

wise fit condition. As a rule, there is no reason to interrupt pregnancy occurring in women with only a single kidney.

(2) An unique kidney does not *per se* compromise the normal progress of pregnancy, labor or puerperium, nor does the development of the fetus in such an organism appear to suffer any loss.

(3) Careful interpretation of the indications and constant observation of the nephrectomized woman during pregnancy is imperative.

REFERENCES

- (1) (Quoted by Mayo) Surg., Gynec., and Obst., 1917, xxix, 1. (2) Bull. Lying-in-Hosp., New York, 1920, xii, 11. (3) Surg., Gynec. and Obst., 1915, xxi, 679. (4) Ann. di ostet. e ginec., 1903, xxv, 692. (5) Travaux de Chir., Paris, 1913, iv, 455. (6) Ann. mal. d. org. gen. urin. Paris, 1911, xxix, 103. (7) Jour. d' urol., 1921, xii, 361 (discussion). (8) Jour. Amer. Med. Assn., 1922, lxxxii, 1634. (9) Ann. di ostet. e ginec., 1896, xviii, 522. (10) Brit. Med. Jour., 1898, i, 423. (11) Berl. klin. Wehnschr., 1896, No. 6. (12) Presse Med., Paris, Oct. 5, 1921.

(Others are given in the Tables.)

59 EAST MADISON STREET.

REPORT OF A CASE OF ENDOMETRITIS DECIDUALIS POLYPOSA

By EARL C. SAGE, M.D., OMAHA, NEB.

MRS. F. J. L., hospital No. 7448; age twenty-seven, white, married. Walked into hospital complaining of cramps in abdomen and some bloody vaginal discharge. Her temperature was 99.6; pulse 96; respiration 20. (She was admitted to the surgical service, as the general practitioner sending the patient into the hospital thought she had a fibromyomata).

The patient was admitted to the University Hospital Dec. 14, 1922. Physical examination revealed a tumor mass in the abdomen four fingers' breadth above the symphysis. Vaginal examination showed the external os slightly patulous with a protruding mass feeling like the fetal membranes. The remainder of the physical examination was negative.

The patient has been married two years. She had one miscarriage seven months after marriage, not induced. Husband twenty-seven years old. Good health.

Menstrual history negative. Periods began at sixteen years—always regular every twenty-eight days. No pain.

Present complaint: Patient consulted a doctor in July for nausea and was told she was pregnant. Five weeks prior to admission to hospital patient saw another doctor who told her she had a tumor of the uterus and should be operated at once. She was sent to the hospital with a diagnosis of uterine fibromyomata. She had had a bloody discharge and cramps in the lower abdomen for four or five weeks previous to admission.

The following day, December 15th 1922, the patient had a slight fever, 101° at 3 P. M. and at 4:30 P. M. passed a heart-shaped mass which was an exact cast of the uterus measuring about four inches in length and three inches in diameter and had a fibrinous outer surface. The inner surface was studded with polypoid pro-



Fig. 1.—Specimen as passed from uterus.

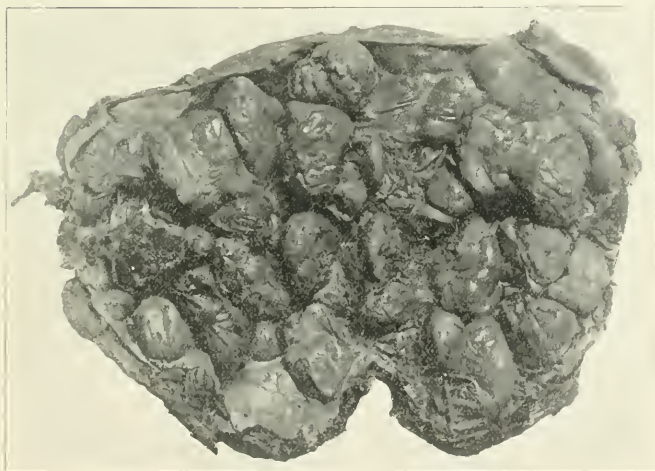


Fig. 2.—Specimen cut open showing polypoid growths.

jections, dark red in color, both solid and cystic and varying in thickness from 5 m.m. to 30 m.m. (Figs. 1 and 2).

Section shows degenerated chorionic villi, blood clot, decidual and epithelial cells. Fibrous membrane encloses whole chorionic villi with hemorrhages into the villous processes. Section through base of villi shows a great deal of inflammatory reaction. Wassermann negative. No other laboratory work done. Report of Dr. Jay J. Keegan.

Puerperium uneventful except for foul vaginal discharge. Involution was slow and patient left hospital on eighteenth day. Patient sat up on thirteenth day. Treatment: Ice bag to lower abdomen, quinine gr. ii q. i. d., lysol vaginal douches.

Not many of these cases were found reported in the literature. DeLee states that during pregnancy the pathologic study of the uterine mucosa is doubly difficult, and without doubt needs reinvestigation by modern methods. Most authors distinguish two main conditions—endometritis deciduae interstitialis and glandularis. The inflammation is usually present before conception, but may arise during pregnancy from a syphilitic ovum or from gonorrhea. He illustrates a piece of decidua vera expelled in an abortion at ten weeks. It is thickened, infiltrated with round cells, degenerated in places, strewn with minute hemorrhages and presents a lumpy, uneven, polypoid surface. Virchow first described this condition as *endometritis deciduae tuberosa* or *polyposa* or both, from a single case encountered at the post-mortem table to indicate the naked eye pathology, polypoid eminences being found studing the placental site. In this case there was a clear evidence of syphilis.

If the glands are affected, either by hypertrophy or by inflammatory hyperemia, a profuse secretion results, which is yellowish, serous, slightly mucous or bloody. Schröder called this *endometritis deciduae catarrhalis*, which may give the clinical course of hydorrhea gravidarum. Should the mouths of the glands be occluded, cysts containing a milky fluid form in them, *endometritis deciduae cystica* of Breus. It is possible that many of the specimens called by the older writers decidua with "uterine milk" were of this nature. Endometritis deciduae is of great clinical importance. It causes relative sterility and frequent abortion. Since abortion often leaves endometritis, a vicious circle is established resulting in abnormal insertion of the ovum, (for example, placenta previa), abnormal formation as to shape, size and thickness of the placenta, infarcts, retarded development of the fetus, abruptio placentae, and thickening and retention of the decidua. During pregnancy one may find pain in the uterus; aggravation of the sympathetic disturbances, especially hyperemesis; painful uterine contractions, sometimes called "rheumatism of the uterus," particularly at or near term; local tenderness, and, in the more acute cases, slight fever, malaise, and bloody discharge which arouses a suspicion of abortion. Much depends on the location of the disease and the extent and time of its occurrence. If the decidua serotina is involved, early death of the fetus and abortion occur, but if the affection is mild, pregnancy may go to term and one will note only anomalies in the mechanism of placental separation, perhaps placenta accreta. The earlier the disease manifests itself, and the greater its extent, the more the likelihood of abortion. The ovum may be transformed into a bloody or fleshy mole.

More recent investigation by Arthur J. Nyulasy² shows that polypoid decidual endometritis is generally caused by gonorrhea or syphilis, and pyogenic cocci.

The morbid anatomy presents two types: 1. Tough, somewhat rounded polypoid eminences, and 2. Leathery papillomatous outgrowths.

Nyulasy refers to Dr. Frank Nyulasy,³ who in 1909 described the condition as follows:—"It is neither a hypertrophy nor an adenomatous condition, as formerly taught, but is a combination of chronic endometritis and metritis, exaggerated by

pregnancy, and usually showing the signs of acute inflammation grafted upon the old chronic trouble as the result of sepsis."

Striking features in microscopic sections are: (1) endarteritis obliterans; (2) very large venous sinuses (dilated capillaries), empty thrombosed, or organized into fibrous tissue; (3) fibrous tissue formation; (4) actual decidual "islands," or decidual cells over fairly large areas separated by fibrous tissue; (5) small-cell infiltration; (6) new formation of muscular elements projecting as ingrowths into the decidua; (7) glands are seldom seen.

Dr. Nyulasy (A. J.) reported the case of a woman, 24 years old, who was delivered ten days previously in a condition of profound sepsis. The attending physician was confident that the placenta had come away intact. Examination showed numerous firm polypoid elevations on the placental site, but could not discover a particle of placenta or membrane. The polypoid outgrowths were removed, the patient continued to deteriorate, and succumbed a few days later.

REFERENCES

- (1) *DeLee*: Textbook of Obstetrics, p. 533. (2) *Nyulasy, A. J.*: Surg., Gynec., Obst., Feb., 1918, p. 331. (3) *Nyulasy, Frank*: Jour. Obst. and Gynec. of British Empire, July, 1909, xvi, 9-15. (4) *Hitschman and Adler*: Ztschr. f. Geburtsh. u. Gynäk., 1907, p. 63. Monatsch. f. Geburtsh. u. Gynäk., 1908, 27, 1. Arch. f. Gynäk., 1913, c, 233. (5) *Curtis, Arthur H.*: Surg., Gynec. and Obst., Feb., 1918, p. 178.

670 BRANDEIS THEATER BUILDING.

Society Transactions

NEW YORK ACADEMY OF MEDICINE

*JOINT MEETING OF THE SECTIONS ON OBSTETRICS AND GYNECOLOGY
AND PEDIATRICS, MARCH 8, 1923.*

DR. WILLIAM E. CALDWELL IN THE CHAIR

DR. RICHARD N. PIERSON read a paper entitled **Spinal and Cranial Injuries of the Baby in Breech Deliveries.**

The purpose of the paper was to add to the evidence that shows that natal and neonatal deaths in breech deliveries are due more often to the trauma and violence of an unphysiological extraction than to a general asphyxia of the baby caused by interference with placental and funic circulation.

The outstanding contributions to the literature were reviewed to date. Autopsy on 36 stillbirths from breech deliveries showed fractures of vertebrae in 38 per cent. Clinical and pathological study of each case showed trauma alone the probable cause of death in 50 per cent of the cases. General asphyxia alone was the probable cause of death in only 5 per cent of the cases. Trauma and general asphyxia may have both been present in 44 per cent of the cases. The need of careful study at autopsy of the cerebrospinal nervous system of all new born babies to discover the true cause of death was emphasized.

DR. BRONSON CROTHERS, Harvard Medical School, read by invitation a paper entitled **The Intracranial Mechanism of Labor and Its Relation to Later Disabilities of the Child.**

Pathological evidence now available indicates that the death of viable infants is usually due to gross injuries of the tentorium or to injuries of the cervical spinal column. Obviously such injuries are fatal only if the central nervous system is damaged.

This paper attempted to formulate a conception of the changes in pressure within the craniovertebral cavity of the fetus when the forces used in delivery are brought to bear.

Physiologically the only important region of the central nervous system, during labor or immediately thereafter, is that between the upper end of the medulla and the lower border of the phrenic nuclei in the upper cord. This region is well protected under normal conditions by the tentorium above and by the spinal column below. In order to explain the effects of rupture of the tentorium it is necessary to examine the theory of discontinuity of pressure, first advanced by Leonard Hill in 1896. According to this theory there is relative or absolute loss of continuity of pressure at the tentorium and at the foramen magnum. Obvious objections to this conception can be stated, but under obstetrical conditions I believe the theory to be valid.

If this assumption is accepted it follows that the tentorium and the falx prevent the severe and irregular forces imposed upon the vertex of the fetal head

from reaching, in full and at once, the medulla. It is also evident that ruptures of the septa may result in impaction of the medulla into the foramen magnum.

The balance of pressure at the foramen in vertex delivery is maintained as long as the dural septa do not give way. In breech labors, however, the release of pressure when the buttocks are delivered results in diminished pressure below the foramen. This downward stream of pressure is intensified if traction or suprapubic pressure is used. The logical result of excessive force is rupture of the tentorium, impaction of the medulla and collapse of the baby. Pathologically the evidence supports this view.

Naturally broken necks involve, almost necessarily, the vital centers of the spinal cord. Various papers, notably those by Schwartz, suggest that many of the scattered hemorrhages, usually regarded as asphyxial in character, are really due to disturbances of pressure after rupture of the amniotic membranes.

While not denying the validity of various observations on asphyxia and on hemorrhagic disease, it seems clear that most of the deaths of viable fetuses can be explained more logically on the basis of injury to the central nervous system as the result of force. In particular the evidence seems to me convincing that injury and not asphyxia is the usual cause of death in breech deliveries.

The clinical study of babies suffering from birth injuries of the central nervous system confirms the pathological evidence. The injuries of the spinal cord, which are responsible, in my opinion for the disabilities of a very large group of crippled children occur, almost without exception, in breech babies. Hydrocephalus is to be expected if the vein of Galen is injured or if hemorrhage and laceration result in blocking the subarachnoid spaces about the midbrain. Furthermore, various disturbances of associated movement in children with cerebral palsies can be explained by basal lesions.

No attempt is made to consider the treatment or the symptomatology of these injuries.

DR. GEORGE H. RYDER presented a report on **A Series of 59 Breech Presentations Treated by Prophylactic External Version.**

The fetal mortality from unconverted breech presentations, as given by the various standard textbooks, ranges from about twenty to six per cent. External cephalic version is mentioned by most authorities as a desirable prophylactic measure, especially by Williams and Cragin.

The author for years followed the plan of converting all breech presentations when possible and feasible into vertex presentations, by external cephalic version.

In 890 consecutive deliveries in private practice there were 59 breech presentations, classified as follows: (1) Nonviable, 7; (2) viable, under observation before labor, 49; (3) viable, not under observation before labor, 3.

The management of these groups was: In the first group no attempt was made at external version.

In the second group (49), external version was done on 29 of which 20 were subsequently delivered normally, 7 by forceps, 1 by the breech after spontaneous reversion and 1 by cesarean section. The remaining 20 had no external version. On 4 it was tried and failed; 3 were delivered by cesarean section (elderly primiparae) and 1 by a breech delivery (young primipara). On 16 no attempt at external version was made; 8 were one of twins; in 5 labor started prematurely; 3 were multiparae at term, 2 after spontaneous version vertex to breech and 1 a placenta praevia. All these 49 fetuses were saved.

The third group consisted of 3 patients not seen before labor consultations.

The first was a case of external cephalic version in first stage of labor under ether, delivered by forceps, baby normal. The second patient was neglected, having been in labor 36 hours with ruptured membranes, 2 weeks overdue, delivered by craniotomy. The third was a case of complete placenta praevia, delivered by breech, a still-birth.

Summary.—The total series of breech presentations included 59.

The fetuses lost from all causes were: Nonviable, 7; viable, 2; total, 9, or 15.2 per cent.

The total number of viable fetuses under observation before labor was 49, 2, or 3.5 per cent.

The total number of viable fetuses under observation before labor was 49; not a single fetus was lost.

After external version, the fetus never turned back in primiparae. In multiparae it did several times, but could easily be returned.

Of the 30 external versions (in Group 2 and 3), 23 were done without an anesthetic; and all but 2 before labor; while 22 of the 30 were done in the 7th and 8th calendar months.

There was no maternal mortality and no ill effects to the mother observed from the versions. Slight bleeding from the vagina was seen in one patient after the version, due probably to undue force owing to poor anesthesia. Both mother and baby were in fine condition after labor.

No mechanical appliances were used to keep the fetus in position after the versions.

Of the whole 59 breech presentations, there were, excluding twins, only 3 full-term breech deliveries in primiparae.

External version failed in 4 women out of 34 on whom it was tried.

The cord was found once around the neck of 5 fetuses delivered as vertex after external version; also of one fetus delivered as breech without external version.

Conclusions.—The safest method of treating breech presentations is by prophylactic external version.

External version not only reduces the fetal mortality, but renders labor shorter and more natural for the mother.

The operation is safe if done without force.

The best time for performing external version is usually the 7th and 8th calendar months.

The operation is generally quite easy and may usually be performed without ether.

When at all difficult a general anesthetic should be used. Under this, in most cases, except late in labor, external version is easily performed.

Force should never be used. If version cannot be accomplished without force, the operation should be given up.

When external version is once performed, the fetus occasionally resumes its original presentation, but usually does not. This is more likely to occur when the version was very easy. Consequently the fetus may be returned as frequently as necessary, even early in labor. When external version is difficult, spontaneous reversion is not apt to occur.

External version performed early gives warning of disproportion between the head and the pelvis, by observation of the way in which the head settles into the pelvis, or may be crowded in by the obstetrician.

Finally, with careful observation in the later months of pregnancy, external version should reduce the fetal mortality of breech presentations approximately

to that of cephalic presentations; and furnishes one more argument for careful antepartum examinations.

DISCUSSION ON PAPERS OF DRS. PIERSON, CROTHERS AND RYDER.

DR. HAROLD BAILEY.—Holland's paper in a recent issue of the *British Journal of Obstetrics and Gynecology* is very impressive, especially the pictures showing the mechanism by which these injuries, following breech delivery, are produced. He describes how the tentorium and falx are stretched and torn. The distention of the vein of Galen breaks off its tributaries and causes hemorrhage.

On the other hand in some of Dr. Pierson's cases, death occurred when there is no evidence of hemorrhage, and Dr. Crothers' has shown us how this may be brought about. Little wrote in the early forties about these cerebral injuries and particularly stressed asphyxia as an etiological factor. I have had occasion to look over his paper and it is interesting to note that he was well informed as to the kind of cases in which these injuries occurred. He knew that breech delivery was one of the chief considerations but he also knew that it occurred in normal spontaneous head deliveries.

At the Manhattan Maternity Hospital, in 1920, I had several cases with symptoms of cerebral hemorrhage. I saw the autopsy of two of these infants and when I encountered the third case with well marked symptoms I operated on the child by the Cushing method by a large osteoplastic flap in the parietal region. This baby is alive today and a year ago it appeared to be a normal infant. However, I feel that this method is not applicable to many of these cases, and personally I do not mean to use this particular method of decompression hereafter. In line with what Dr. Crothers has said the cases that live are those with cerebellar or medulla trauma. In regard to the decompression, if we use that procedure it is probable that the typical subtemporal decompression is the best operation. All we can hope to accomplish is to decrease the intracranial tension. There is seldom free hemorrhage just below the dura; the hemorrhage is usually subarachnoid.

At the Manhattan Maternity in a series of 100 cases of autopsy in which the skull was opened the brain was looked at from the standpoint of hemorrhage and the tentorium was not especially examined. There were forty cases of hemorrhage, —about 25 per cent occurred in breech delivery, 25 per cent in forceps and about 40 per cent of the babies were born spontaneously with the head in the vertex position. In cases in which hemorrhage was found there were minute hemorrhages in other organs and the pathologist always added a diagnosis of asphyxia as one of the causes of death.

Now as to the slow version, it seems to me that in delivering an after-coming head if you are not going to pull it through at once it will remain compressed within the confines of the pelvic inlet and nothing is gained by allowing the baby to hang there. It is just as well to press it through from above and complete the delivery. In Holland's cases about 58 per cent were head cases. The tentorium rupture in these cases may be accounted for in the same way as were the breech cases that Dr. Crothers described,—that is, the traction on the head with the shoulders held back by the lower uterine segment or the pelvis, it is possible to lengthen the spinal canal and the cord must give with resultant hemorrhage or rupture or there must be hernia of the medulla into the foramen magnum.

This review of our statistics as has been pointed out by Dr. Dickinson is of great value to us and I am amazed at the number of these birth injuries in the elective version cases. I had no idea that the fracture of the spine in the neck region was as frequent as Dr. Pierson has shown. If his work is upheld by the reports from other clinics we will be absolutely forced to give up elective version

and certainly this demonstration tonight would convince us that the Smellie-Veit method of traction must be abandoned and the head must be pushed down from above.

Dr. Ryder's paper interested me because I have been employing external version for a number of years. I never do this procedure more than three times on the same patient for fear of winding the cord around the baby's neck. I have never employed anesthesia for this procedure. If, after three attempts the breech does not come out of the lower uterine segment I give up the idea of turning the baby and allow it to go on as a breech presentation. There is one point that Dr. Ryder does not bring out in regard to this method of turning,—the head must be brought around *occiput first* otherwise the head becomes extended and the version becomes impossible or a face presentation results. If one is to use this procedure he must know exactly how the child lies and I do not think it should be done by any one who is not an expert.

DR. ALFRED S. TAYLOR.—While I am not an obstetrician nor a pediatrician I have had some experiences with children who I presume have survived accidents similar to those described here tonight. It seems to me that the lesson is that the obstetrician must spend a great deal of time in correlating the mechanics of delivery and the physiology of the infant. It would be interesting if somebody could get an idea of how many children survive accidents of this type and become anything like normal individuals when they grow up. That item of information perhaps cannot be given until after this work has been developed. Another point of interest is that this work will have a great influence on methods of treatment in cases of this type. If it is shown later that children with these birth injuries merely live and are an economic waste to themselves and to the community then the problem is simplified very greatly. If it can be shown that a certain percentage become normal individuals that would be an incentive to develop methods of treatment.

Of these injuries hemorrhage is the most obvious pathologic item, but it has been shown that a certain percentage die where there is only rupture of the tentorium without hemorrhage. If an adult had an injury giving symptoms analogous to those described in infants in which there is no hemorrhage, one would feel that the patient had sustained a damage of brain substance. Hemorrhage in the skull would not cause death unless there was concomitant or secondary injury to the nervous tissue. While an infant's tissue will regenerate more quickly than that of an adult, it is more sensitive to trauma; therefore, it would be my feeling that the central nervous tissue is seriously damaged as a result of damage to the tentorium, and injury to the nervous tissue is always the essential cause of these fatalities. In adults there may be fracture of the fifth and sixth cervical vertebrae that does not cause death; and in infants with such fractures there must be an extension of the injury to the medulla. That is, a fracture of the spine itself would scarcely be sufficient to cause the immediate death we see in these cases. Another fact is that a certain number of these children grow up and at a late period show degenerative lesions in the brain that make one feel that primarily there must have been injury to the brain substance at birth.

In a few cases that I have encountered there have been delayed symptoms and failure to yield to therapeutic measures. I remember an eleven-year-old girl with the history that after a difficult forceps operation she was born cyanosed. She was resuscitated, but after four days she had a fainting attack. She then went along until she was seven years of age in a fairly normal way. Then epilepsy developed to the extent that there were major attacks preceded by sensory aura in the left palm. After four years' treatment during which her teeth were treated

and her tonsils removed, etc., she was brought to an internist and it was decided that the focal lesion was in the cranium. Operation was performed and the dura found adherent over an area more than 8 cm. in diameter involving motor and sensory cortex. It was assumed that this was the cause of the seizures, but before closing the wound it was observed that in the temporosphenoidal lobe there was a yellowish area which was quite soft. From this three ounces of clear fluid, obviously the result of degeneration, were evacuated. Temporosphenoidal lobe was degenerated, there being very little brain substance surrounding the cyst cavity. An attempt to enucleate the cyst wall unsuccessful. The patient was then fairly well for about four years, when she had headaches and eventually developed major attacks of epilepsy again. The cyst area was tapped several times and finally an attempt was made to enucleate the cyst, but it had eroded into the descending horn of the lateral ventricle, making a connection between the cyst cavity and the entire ventricular system, so the wound was again closed. The patient then experienced relief for nearly a year, but now has seizures again.

If a child escapes with its life and develops such a lesion it is a question whether one does well in trying to save it at the time of birth. Hence it is important to determine what proportion of these children become valuable members of the community. The method of Payer of aspirating spinal fluid may be of use in determining the presence of blood in the upper spinal canal or posterior fossa of the skull. If there is great pressure on the bulb one might undertake some surgical procedure, but it seems to me that in supratentorial hemorrhage decompression would not be very satisfactory, because of the situation of the hemorrhage which originates at the base of the brain. I recall one case in which for thirty hours there was rigidity of the right side, and after forty hours convulsive attacks and greater rigidity. An opening was made and a thin cortical clot found. This was followed down to the base and traversed the Sylvian fissure where the clot was massive and could not be evacuated. At autopsy there was found a great clot involving the entire base of the brain, beginning at the Sylvian fissure and extending to the posterior fossa and the spinal canal. By no operative procedure could one hope to overcome that condition. If one has a hemorrhage about the bulb with which to deal, the only thing to do would be a cerebellar decompression to relieve the pressure on the bulb.

In the spinal group I have seen only one child and this had sustained a left-sided birth palsy and complete paraplegia. I saw the child when it was five weeks old. The left brachial palsy had recovered, but there was complete paraplegia, no reflexes, no sensation, and the sphincter control was lost, the abdominal muscles were completely paralyzed and also the intercostals, and sensation was absent to pinprick to the fourth dorsal segment. I should like to know what is going to happen to that child. With a transverse lesion at the fourth dorsal vertebra one would expect spastic rather than flaccid paralysis. Judging from adult symptomatology one must postulate a total ruination of the motor cells from the fourth dorsal segment downward. There could be no treatment for that child; it would always be a handicap to itself and to its parents.

DR. ROYAL STORRS HAYNES.—I feel that a pediatrician can contribute to the discussion of these papers only his admiration for the work which they represent and the new view which they disclose. Their effect should be to reduce the number of cases of this kind that come into the pediatrician's hands. I am glad to have the question of asphyxia clearly defined. It has always been an indefinite diagnosis and its explanation on a mechanical basis clears matters up.

In my opinion hemorrhagic disease without trauma must be a very infrequent cause. The infant enters life incompletely equipped as regards his ability to

coagulate blood. This is but one of a number of functions which require adjustment to extrauterine life. The demonstration of a prolonged coagulation time merely shows the underlying predisposition of the new born to bleed if an exciting factor be present. The other evidence of this predisposition, namely, the low blood platelet counts has long been known. In a few days after birth in most infants this count regains its normal proportion, unless there is an underlying disease which prevents it.

DR. ROBERT L. DICKINSON.—The invaluable instruction concerning the physics of the brain under pressure greatly helps this renewal of interest in the mechanism of obstetrics. If every student learns skill in this and then adds the new points of tonight, *plus* slow extraction, then we shall save a large proportion of the 10 per cent of deaths due to breech delivery. Second, in regard to conversion of breech into head presentation, the new attitude is insistence on early version. The further along in pregnancy the snigger the fit, the less the likelihood of easy version.

Of the utmost value is the novel finding that in postmortems we must study all spines. I hope Dr. Pierson, when he publishes his paper, will include an accurate description of his technic so that we shall know how a brain should be opened without confusing the findings. That cerebral hemorrhage is a very frequent cause of fetal deaths is a point new to the laity, one which has not been insisted upon, and it is especially important that people should know that a large proportion of hemorrhages into the brain occur and thus explain many fatalities in spontaneous or even easy births, supposed to be due to suffocation. We must now, by postmortum, determine whether the proportion of brain-injuries be much larger in skillful low forceps extraction than in spontaneous labors.

DR. PIERSON (closing).—Dr. Dickinson has properly emphasized the necessity for establishing as nearly as may be an adequate technic for the demonstration of the lesions that have been discussed tonight. The following is my autopsy technic: Midline incision from chin to pubis passing to left of naval. All organs of neck, thorax and abdomen examined *in situ*, removed, weighed and preserved in formalin and Zenker. All vertebrae exposed anteriorly and examined for luxation and fractures. A posterior incision is then made from occiput to sacrum in the midline. Starting at the sacrum, the transverse processes are cut with bone forceps and the spinal cord examined throughout its length. The dura is then split longitudinally throughout its length. The complete cord is then removed inclosed in the dura and preserved in formalin. The scalp is then incised approximately in the line of the coronal suture and the scalp reflected anteriorly and posteriorly over the entire skull. The anterior fontanel is punctured with a knife at its lateral margin so that bone scissors may be inserted. The bone and dura are divided parallel to the longitudinal sinus but at a safe distance from it posteriorly as far as the lambdoid suture and anteriorly as far as possible. The flap is then continued posteriorly along the line of the lambdoid suture and squamous suture and as low as possible on the frontal and parietal bones. Each hemisphere is then studied and removed separately. Then the tentorium is divided and the contents of the posterior fossa studied and removed separately.

DR. CROTHERS (closing).—There are one or two points of obstetrical technic which are of interest. If the fetal pulse becomes slow I should suppose the fetus was suffering from cerebral compression. Logically the speeding up of delivery involves increasing this pressure.

Dr. Bailey suggested that extension of the spinal column with its effects upon

spinal pressure occurred in head cases where forceps were used. To a certain extent this may be true, but such extension would be limited to the neck.

If the baby is suffering from subtentorial hemorrhage it is clearly not particularly useful to do a decompression. If the cortex is seriously injured, a decompression may save life but will not restore damaged cells. My inclination, entirely unsupported by experience, would be to do suboccipital decompression if subtentorial hemorrhage is recognized, on the theory that if successful it might save a baby whose cortex is capable of normal development.

Lumbar puncture is logical if there is free communication between the spinal canal and the ventricles. The only cisternal puncture I have seen was unsuccessful, as hemorrhage had obliterated the cisterna. Also the medulla is apt to be dislocated downward if there is subtentorial pressure; thus exposing it to injury by the needle.

As to the question of cord injuries. I have seen 14 or 15 cases mostly due to extraction, but I have only once seen a complete flaccid paralysis and here the cord was completely destroyed. The ones that are spastic are those in which there is a partial saving of the fibers, and if one may draw an analogy from the observations made on soldiers, complete lesions do not result in spasticity; children with complete lesions are relatively flaccid though they may have lively reflexes.

With regard to the question of hemorrhagic diseases in the new-born, Warwick and the Minnesota group pay very little attention to the mechanical injuries of the tentorium and fractured cervical vertebrae. Their findings are purely tentative and the same thing applies to them as applies to the supporters of the asphyxia theory. Their interpretation will stand only until enough autopsies are performed with adequate attention to ruptures to prove that injury can be ruled out.

DR. RYDER (closing).—Dr. Bailey asked how many times external version may be performed on the same patient; and says that he makes it a rule to stop after the third time. He gives as a reason the danger of winding the fetus up in the cord. I would say that the fetus may be turned as often as it is necessary. I turned one four times with good results at birth. It is to be remembered that if the cord is wound around the fetus in turning, it will probably be unwound when the fetus turns back. Also that we are as likely to unwind the cord as to wind it when we do a version. In my series there was no difficulty from the cord around the neck of a fetus.

Vertex deliveries in normal pelvis are so much easier and safer than breech deliveries, and external version is usually so easy, that it does seem as though systematic effort should be made to convert breech presentations before labor. Nearly every obstetrician does it on his private patients, but so few publish their results.

In this series of 49 viable fetuses under observation before labor all the fetuses were saved. This did not require great skill. On the other hand, I doubt if any obstetrician, however skillful, could have delivered all these 49 patients by breech deliveries and saved all the fetuses. At least if he could, he would have better statistics than any ever published, so far as I know.

In the interest of a lower fetal mortality, then, I make a plea for more general prophylactic external version.

THE NEW YORK OBSTETRICAL SOCIETY

MEETING OF FEBRUARY 13, 1923

THE PRESIDENT, DR. R. H. POMEROY, IN THE CHAIR

DR. FRANKLIN A. DORMAN reported a case of **Posterior Sacculation of Bicornate Uterus—Cesarean Section.**

Mrs. D. M., (Woman's Hospital No. 14002 M.) age twenty-two, primipara, Roumanian, of generally good physical development. External examination negative, except for scar of appendectomy four years before, otherwise previous history had been normal. Menses began at 12, and normal. Vaginal examination at the end of eight months showed the head in the brim of the pelvis. The labor began with rupture of membrane at term. The character of the labor was poor, with weak and irregular pains. After eight hours, the vaginal examination showed the

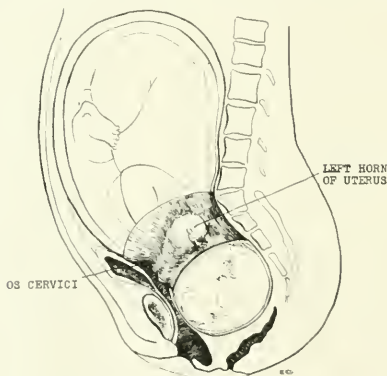


Fig. 1.

head well in the pelvis. The cervix was about 2 cm. in length and admitted only the tip of the finger. It was found more anterior than usual, at about the lower margin of the pubes. After ten hours of very poor first stage pains, the labor stopped for twenty-four hours. Castor oil was given to stimulate contractions, causing the resumption of weak irregular pains. Vaginal examination nine hours later showed that the presenting part had advanced a little farther into the pelvis. The cervix had moved farther anterior and seemed higher, and could just be felt behind the symphysis. It admitted one finger. Abdominal cesarean section was done 35 hours after the onset of labor.

The abdomen was opened by a 7 inch incision in the median line, with the central portion a little below the height of the navel. Small amount of free fluid present. The uterus was thin walled, covered with many large vessels. The head of the infant occupied a sacculation posterior to the cervix and extending well

down below the mid-pelvis. (Fig. 1.) From the left wall of the uterus, projected a horn the size of a nonpregnant uterus. The uterus was incised and the child extracted. There was much free meconium. The uterus was then delivered from the abdominal cavity and the placenta and membranes removed. The child was normal and in good condition.

The uterus was found to consist of two uterine cavities connected by a broad attachment to a common cervix. The right cavity contained the child. Each uterus contained a tube and ovary. The uterine and abdominal incisions were closed by three layer catgut sutures.

Following the operation the patient had an irregular temperature from normal to 102.6° F. for nine days, apparently due to faulty drainage. She was discharged on the 20th day after operation in good condition.

Binmanual examination at the follow-up clinic has shown the uterus well involuted, and the separation between the two horns can be felt.

DR. FRANKLIN A. DORMAN also reported a **Full Term Ectopic Pregnancy, with Living Child.**

Since reporting two cases of full term ectopic pregnancy with living children, some two years ago, a third case came under the care of the writer.

Mrs. J. L., (Woman's Hospital No. 13068) age twenty-five, applied September 26, 1921, for prenatal care. Previous history negative. Menstruation began at 15; regular, every 4 weeks, lasting 3 days, with occasional pain. One year previously there had been a spontaneous early abortion. Her last normal period was March 6, 1921. Life was felt in June. The expected labor was estimated to be December 13, 1921. She suffered from morning sickness continuously from the seventh to the 12th week. Her habitual constipation increased during pregnancy. Although there is no history of any attack of sudden abdominal pain, she had suffered for the past two months from abdominal pain which was increased by exertion. For the past month fetal movements had been very active. At this time the position of the child was noted as breech, with size of fundus (sic) seven months, fetal heart not noted.

On October 14, she complained of intestinal disturbances. On November 18, the child's position was noted as transverse. The time of gestation was estimated as eight and one-quarter months.

On November 26 she entered the hospital. The pains commenced at 9 P. M. on the 27th. The position of the child was indeterminate. Three hours later a vaginal examination described the cervix as long, soft, with dilatation of one finger at external os and with the internal os closed. Ten hours later she was examined by the writer. The external os admitted two fingers. About one inch above this was an apparently rigid stenosis. The finger passed through this, and recognized a funnel shaped cavity about one inch long. At the end of this cavity, with difficulty, something like a fetal part was reached.

The patient had now been in apparent labor for twelve hours. The intervals between the apparent contractions were also painful, and abdominal rigidity was constant. Conspicuously felt to the left and above the navel was the head. Because of the extreme rigidity of the internal os, laparotomy was decided upon. Ectopic pregnancy was suggested but its probability largely discounted because of something felt with the finger inside the cervix.

The abdomen was opened in the midline to the left of the navel by a six inch incision. The fetal sac was thus exposed, showing through it the presence

of meconium. The sac was incised and the child extracted. On the anterior surface of the sac were some omental adhesions which were ligated and cut. The emptied sac was lifted from the abdominal cavity. Its attachment was to the fundus of the uterus and the left broad ligament. The left broad ligament was clamped and removed, and also the uterus supravaginally, because of its intimate attachment with the sac. The right ovary and tube were left in. The stump of the cervix was sutured by interrupted catgut. The large arteries were individually ligated, and the peritoneal layers of the broad ligament closed over. The peritoneal cavity was then cleansed of blood and meconium, and the abdomen closed with layer catgut suture.

The child was a male infant weighing seven pounds, thirteen ounces, cried promptly and when discharged on the sixteenth day, was in good condition, having gained eleven ounces after an initial loss of ten ounces. He was partially breast fed. There were no abnormalities except a slight asymmetry of the head.

The patient's recovery was uneventful, the highest temperature being 101.6° on the second day, with a pulse between 80-90. Healing was by primary union. She was discharged out on the 16th day in good condition.

Pathological report.—The specimen is a large bluish sac, 20 cm. in diameter, to which the supravaginally amputated uterine body, measuring 7 x 7 x 3 cm., is attached. The uterine mucous membrane is thick, looking like typical decidua. The sac shows many adhesions all over the surface, some of them from the omentum, and is of the usual typical structure of this tissue in many areas. Inside of the sac is a large full term placenta, 20 cm. in diameter, and $\frac{1}{4}$ cm. thick. On the surface of the placenta, numerous cysts, up to 2 cm. in diameter are found. The wall between the uterine cavity and the amniotic cavity at one point is very thin, almost membranous. The wall shows no opening anywhere into the uterus. The umbilical cord is 40 cm. long, inserted very near the margin of the placenta, and shows numerous false knots. Six cm. from the actual uterine body, an ovary, slightly increased in size and containing numerous small follicular cysts, is attached. The tube is 12 cm. long and is inserted into the sac 12 cm. from the uterine body. It cannot be traced any farther, and is patent until it reaches the sac.

On splitting the uterus, its cavity is 6.5 cm. broad. The wall of the right horn (the side to which the large sac is not attached) is 1 cm. thick. In the centre, it is 2 cm. thick. The cavity has a convex cavity downward, so that a slightly two-horned uterus is formed.

Diagnosis.—Full term abdominal pregnancy, following ectopic (tubal) or interstitial pregnancy.

DISCUSSION

DR. O. PAUL HUMPHSTONE.—This specimen impresses me as being a pregnancy arising in a rudimentary horn of the uterus which has gone through the rudimentary horn. The tube and ovary are partly attached to this sac on the outer side and quite away from the uterus. I have encountered a full term pregnancy in a rudimentary horn of the uterus with no connection between the rudimentary horn and the uterus itself, and my vaginal examination of the patient was entirely similar to Dr. Dorman's experience. In my case I found a small uterine cavity with a thinned-out wall between it and the pregnancy sac.

I would like to ask if the pathological report showed any uterine muscle fibers in this attenuated part of the sac.

DR. FRANKLIN A. DORMAN.—I do not think they were demonstrated.

DR. J. M. MABBOTT.—I think that the reader has been unnecessarily severe in his criticism of his own examination *per vaginam* and *per os uteri*, because after hearing the greater part of his report and hearing about the very thin wall of the uterus and the sac being practically membranous, I suspect that he really did get a finger against the fetal part which gave him the impression that it was an intrauterine pregnancy, although I am perfectly satisfied, of course, that it was not. I agree with Dr. Dorman rather than the last speaker that it was an ectopic pure and simple, tubal or interstitial, but think that wall now contracted in the specimen as received by the pathologist was thinner still in the living specimen, and for that reason probably your finger did come against some part of the baby, which was head upward, such as a knee or heel, or breech.

DR. FRANKLIN A. DORMAN.—I think Dr. Humpstone is quite entitled to his opinion. There is a question mark put after "interstitial." The point is that the configuration of the uterus in the ectopic case seemed to be that of a bicornuate uterus. The pathologist described the thinning of the uterine wall next the sac. Undoubtedly there was some malformation, but it does look as though the development of the fetus was in the uterine tissue and something that comprised the wall of the uterus. As there was a thin partition between the uterine cavity and the sac, it is quite possible there was a sensation of a fetal part against my finger.

With regard to the sacculated uterus, I would be very much interested to know whether anybody here has ever encountered anything like it. A condition where the uterus is sacculated posteriorly at full term and the cervix has traveled way up behind the symphysis so you can barely reach it, is a great rarity. The only things that resemble it are cases of ectopic where the child is in the broad ligament and has pushed the uterus up above the presenting part.

DR. GEORGE W. KOSMAK presented the **Report of a Case of Spontaneous Rupture in a Fibroid Uterus, with False Diagnosis of Placenta Previa.**

Mrs. D. L. (No. 82600) was admitted to the Lying-In Hospital in the early morning of January 26, 1923, with a diagnosis of placenta previa made by an outside physician. No definite history of the case was obtainable on admission except that the patient had been bleeding severely. Subsequently it was learned from the husband that she had been in labor for several hours when the pains suddenly ceased. She had had four previous children without incident. The patient was seen by me about an hour after admission and I found a well nourished woman, very pale, restless, with a small thready pulse of about 120. She was apparently at term. There was a moderate bloody vaginal discharge and no fetal heart sounds heard. The patient seemed in a condition of shock from hemorrhage and the diagnosis of placenta previa which accompanied her admission slip seemed the most probable one to account for her condition. Preparations for immediate examination under an anesthetic were made. The relaxed outlet permitted ready manual palpation of the cervix which was apparently fully dilated with a soft mass projecting from the lateral and anterior wall, which was assumed to be the placenta. Fetal head was high and not engaged. Immediate version and breech extraction were decided on. The left hand was passed along the membranes, both feet seized and brought down without difficulty; the head readily displaced upward and the extraction of the trunk together with the posterior and then the

anterior arm accomplished without undue force or traction. The head was engaged in the transverse diameter of the inlet and slowly brought down to the pelvic floor, then rotated and delivered without any trouble or lacerations. The patient bled very little at this time but an immediate attempt was made to extract the placenta, after which uterine tamponade was to have been done. Much to my surprise, the placenta was found on the anterior wall, low down on the left side and separated for about one-half its extent. It was easily extracted. The mass projecting from the cervix which I had assumed to be the placenta, was a soft fibroid. Further exploration showed that what I had accepted as a soft, fully dilated cervix was a very much lacerated cervix and the laceration extended into and through the lower uterine segment. The tear involved the broad ligament and a loop of intestine prolapsed during the manipulations. In other words, in place of a placenta previa, we were dealing with a ruptured uterus and a projecting fibroid in the lower segment simulated closely a partially separated placenta.

The question of further treatment resolved itself into following a conservative course. The patient's condition of shock from hemorrhage precluded the possibility of any good results from a hysterectomy; moreover all bleeding had apparently ceased. The uterus was accordingly packed with iodoform gauze and likewise the ruptured lower segment after carefully replacing the gut, and then the vagina was also packed.

The baby was well developed, apparently full term; had been passing meconium freely and was dead at the time version was done. The placenta was large and thick with a dense clot covering about one-half of the maternal surface.

The patient was immediately given a hypodermoclysis of saline solution and stimulated freely. She made prompt recovery from the primary shock but on the next day developed considerable distention of the upper abdomen, which, however, was relieved by gastric lavage. After the first twenty-four hours she began to get very restless and subsequently became delirious. The vaginal packing was removed after the first day and a portion of the uterine gauze on the second day. The discharge was clean, watery, and without odor. Her general condition did not improve and she died on February 1st—four days after admission, apparently from exhaustion. There was no evidence of any progressive sepsis.

DISCUSSION

DR. FRANKLIN A. DORMAN.—What was the mechanics of the rupture?

DR. A. B. DAVIS.—I have not had any experiences of this kind. I followed this case along and know of Dr. Kosmak's judgment in it, and at no time did it seem to him or to me that it was advisable to do anything other than what we were doing. The patient was in no condition to be operated on at the time she came in nor later. She had a better chance, it seemed to me, to get well without subjecting her to an operation. Ordinarily, I think that in rupture of the uterus, regardless of whether fibroids may or may not be present, out of a series of cases we will save more by immediate hysterectomy than by letting them alone, because in our early experience in the Lying-In Hospital we lost every case until we began to do hysterectomies, then we saved most of them.

DR. KOSMAK.—I am not prepared to fully answer Dr. Dorman's question. I do not know anything about the labor in this woman except the history we got from the husband. He said she had very active pains for several hours, which suddenly ceased and I can only imagine, as it was a good sized baby and the patient was a good strong woman, that the head was forcibly driven into this

lower uterine segment which simply did not, after reaching a certain stage, expand as it should.

The development of fibroids in pregnant uteri is a subject which has not been given sufficient attention. We do not know just why this hypertrophy should take place, but in many instances the tissue which makes up the fibroid is structurally very much like that which makes up the body of the uterus and there is simply, as near as we can make out, not long enough circulation to take care of this rapid growth of tissue. Consequently, it becomes starved and is subject either to necrosis of some kind or the uterine wall is so weakened that it cannot resist the ordinary force of the uterine contractions. These should be equally distributed in a uterus that is uniformly of the same structure throughout, but where part of the wall is evidently weakened by the excess growth of such tissue as we find in these rapidly growing tumors, inequality in the application of the forces, may bring about a rupture of the organ. I have no other explanation to offer.

DR. WILLIAM P. GRAYES, of Boston, (by invitation) presented a paper entitled **The Olshausen Operation for Suspension of the Uterus.** (For original article see page 137.)

DISCUSSION

DR. F. C. HOLDEN.—I have seen Dr. Graves do the Olshausen operation, as described on the type of case which has always bothered me, namely, an anteфлекted retrocession, the kind of case we used to dilate and put in a stem, with the result that the patient would be better for several months and then have a return of the old symptoms. Since then I have treated all cases of this type by dilatation and stem, plus the Olshausen, with uniformly good results. The operation is the simplest thing imaginable. The results are that of the Gilliam without any trauma or possibility of adhesions. In our experience it does all that Dr. Graves says. We have used it 98 times in the last year at Bellevue Hospital and we have yet to record a failure. In one case done in a hospital where I was not sure of the asepsis, an infected wound had a sinus leading down to one silk suture, which three months later was discharged and the wound healed spontaneously. We feel one should individualize. There is no one operation which has been devised or which will be devised that will cure all types and conditions of cases. Those of us who have never had the misfortune to devise an operation to which our name has been applied still feel that there must be individuality; that this operation does not meet the requirements of every case. I have not utilized it as extensively in prolapse as has Dr. Graves. I have used it more for retrocession, anteфлекcion and retroversion without recording any dystocias or intestinal obstructions. No failures have thus far been noted. In my estimation it is the best operation for a large percentage of cases.

DR. HOWARD C. TAYLOR.—So far as the Alexander operation is concerned, it is an operation I have never performed and so have no personal experience with it. This operation does not seem to be mechanically sound for the reason that he has given because the suspension is more or less from the side and not the direct suspension such as that obtained with the Gilliam or the Olshausen operation. I differ from Dr. Graves in the value of a ventral fixation, by which I mean not a suspension of the fundus of the uterus to the abdominal wall, but

a definite ventral fixation. Of course one must have a case that is not going to have more children, for no one would think of doing a ventral fixation on a woman who is likely to have more children. In those cases in the childbearing age, either of prolapse or retroversion of the uterus, I do the Gilliam operation more frequently than any other and I am not convinced by Dr. Graves of the advantage of the Olshausen over the Gilliam operation. As regards intestinal obstruction, I think the risk of intestinal obstruction is greatly overestimated. We must bear in mind that in ventral suspension, the Gilliam and the Olshausen operations are done very frequently, probably more frequently than any other operation, and I believe if intestinal obstruction took place frequently we would hear of it. The actual number of cases of intestinal obstruction reported is small. You can get it after any abdominal operation. It seems to me that the risk of intestinal obstruction from a suspension operation is not sufficient to abandon the procedure.

As to trauma of the peritoneum I do not think there is more trauma to the peritoneum in doing a Gilliam operation, than there is in doing an Olshausen operation. I do not draw the ligament through the fascia in doing the Gilliam operation, but suture it to its posterior surface ordinarily through a transverse incision. The silk ligature used in the Olshausen operation probably causes as much trauma as drawing the round ligament through the peritoneum.

Regarding the cystocele that goes with many cases of prolapse, I do some type of displacement of the bladder, freeing it from the uterus and attaching it higher on the uterus so as to be more certain of its cure. I would not rely entirely on the fascia.

DR. DOUGAL BISSELL.—If a stranger should come into this assembly and hear our conclusions concerning our favorite surgical procedures, his judgment would, I believe, be that either our wish was father to our thought, or any one of the operations advocated was equally applicable to any one or combination of operations under consideration.

There are but few of the almost innumerable operations devised for the correction of retroversion that are based upon mechanical principles simulating those which originally controlled the organ involved. Of the many that are open to criticism, I think Kelley's fixation, Olshausen's, Coffey's, Baldy-Webster's and Gilliam's stand in the first rank and in order mentioned.

It is a fact that many procedures which will prevent the corpus from occupying the posterior culdesac may furnish relief to the patient, who has been a sufferer from the nerve racking pathology involved in retroversion; and the gratitude expressed by the goodly proportion is enough to make the operator feel that he has a means at hand to master the situation.

The average surgeon is either too busy, or fails to recognize the importance of analyzing his results. He is satisfied to form his conclusions from the favorable cases he may personally examine or hear from indirectly.

We therefore grant that practically all operations for the correction of retrodisplacement meet with success within certain limits. I have not been satisfied to accept the limitations imposed by the various popular procedures and refuse to put in practice any operation which will substitute one abnormality for another, unless it be the only way to furnish relief.

It is my opinion, based upon a considerable experience and opportunity to follow closely my results, that the corpus can be restored, permanently, to its normal position with the least possible changes in anatomical relationship or variations from the normal.

What are the mechanical principles involved in such a procedure? How is the uterus supported and how is the normal position maintained? Whether the

corpus is anteverted or retroverted, the structures which support the uterus remain constant with respect to the particular function of support. What is the primary supporting structure of the uterus? It is that strong fascial structure in which the cervix is embedded, which radiates laterally and is attached to the bony frame work of the pelvis. In retrodisplacement the function of this structure is not seriously impaired, as is evidenced by the fact that the standard position of the uterus can be re-established and maintained without resorting to surgical work upon this structure. This restoration may be accomplished by procedures upon the round and broad ligaments which nature utilizes under normal conditions for a similar purpose.

The round and broad ligaments are so situated as to limit the corpus in its normal excursions, i.e., towards the sacrum as the bladder fills, and to assist in normal restoration of position when the bladder is being evacuated. The uterosacral ligaments act in a similar manner but to a lesser degree. The round ligaments and the upper portion of the broad ligaments are attached to the extremity of the long lever or corpus—while the uterosacral ligaments are attached to or near the pivotal point. From a mechanical standpoint, therefore, the round and broad ligaments are the logical tissues to be utilized in the correction of retrodisplacement of the corpus. As it is an accepted principle that peritoneal union is never a stable union—and yields when traction is made upon it—the shortening of these ligaments should never be accomplished by the folding of them and the union of their peritoneal surfaces, but by the union of their raw surfaces.

In reconstructing these ligaments the point of uterine fixation and pelvic anchorage should not be changed, also they should be recreated uniformly strong throughout. In my operation I attack both the round and broad ligaments, without changing the points of anchorage on the uterus or pelvic areas; and shorten them by the removal of excessive tissue between these points and suturing the raw surfaces in such a manner as to reinforce or strengthen this middle portion.

When the round ligament becomes overstretched and fails to function, this failure is not because one point of anchorage is weaker than the other as is commonly supposed, but because the tissue between becomes overstretched, and loses thereby its power of muscular action.

I am unable at this moment to make a definite statistical statement but believe I approximate the truth when I state that the number of recurrences have been extremely few and those have been the result of an improper application of the technic. A failure was observed in my return clinic this week. But this failure was the outcome of work done under conditions not ideal for the technic employed, namely, the broad ligaments were injured by an inflammatory process involving the tubes and incidentally the broad ligaments. I have yet to see a single case recur after labor and I have had labor follow the operation as many as three times.

I have studied the normal and abnormal positions of the uterus by lateral x-ray pictures with an iron stem inserted into its canal. I have been able to determine its normal changes under the influence of bladder distention and its limitations of motion after the ligaments have been shortened.

With regard to the application of Olshausen's technic for the cure of cystocele or rectocele, it is beyond my imagination to conceive of its success. Cystocele and rectocele are separate and distinct entities and demand individual surgical procedures.

DR. RALPH H. POMEROY.—I cannot let this opportunity pass without referring to the procedure which has been so consistently carried out and so relied upon by our late friend and councillor, Dr. L. Grant Baldwin, whose efforts to suture the anterior vaginal wall after the fashion of Emmett produced certainly an artificial strap or ligament across the vagina that does in many cases exactly what Dr. Graves has been advocating, that is, raising the pivotal point of the uterus at a level of the internal os to a higher level in the pelvis. While many of us perhaps are not truly conversant with the technic of Dr. Baldwin's procedure and many have heard it damned with faint praise, I still hope that some one will carry on sufficiently to prove in the long run whether it is as useful as he thought it to be.

DR. GORDON GIBSON.—I think a good many of us can agree with the principle that the attempt to suspend the uterus when retroverted by the round ligaments is faulty, and that we must agree sooner or later that it must be a suspension rather than a drawing forward. I do not believe many of us will agree that you can cure a prolapse by suspending it. I am convinced from seeing Dr. Baldwin's work and from the cases that I have had the opportunity to do, that it is possible in a very large percentage of cases to cure prolapse by plastic operation.

The only trouble with Dr. Baldwin's proposition is that it is a difficult operation to do. The principle is the same as that in the Fothergill operation, the same as in Dr. Bissell's operation, the same as that in Dr. Rawls' operation, namely, using the pelvic fascia, bringing it forward as a sling in front of the cervix. The only difference is in the way that the points of the pelvic fascia are approached and held together. It is, as you know, simply a modification of the old Sims' operation, the modification being that instead of relying on the mucous membrane and sewing up these areas it is a deep stitch with silver wire into the pelvic fascia beside the cervix.

A great many of these women who have passed the menopause have a small, atrophied uterus, and it does not take very much to hold the uterus up in these cases, and in prolapse the lesion is not uterine at all, but, as Dr. Graves pointed out, it is a stretching of all the pericervical tissues, and anything which will take up the slack of the pericervical tissues should cure the prolapse.

I would like to call attention to the point which almost everybody has lost sight of, that Dr. Graves does not depend on the Olshausen procedure exclusively, in cases of prolapse but does plastic work on the cystocele and rectocele. The question is, is it worth while to suspend a small atrophic uterus in some of these cases where it can be supported from below?

DR. H. B. MATTHEWS.—I have done a great many Olshausen or, modified Olshausen operations, modified in the sense substituting No. 2 twenty-day chromicized catgut, for the silk ligature in very much the same way as Dr. Graves has described, with the exception of catching hold of the round ligament with an ordinary mouse-tooth forceps and scarifying the ligament at the place around which the ligature passes and passing the chromic catgut about in the same manner, tying it on the inside. I think that it has many advantages over the Gilliam operation for the reasons that Dr. Graves brought out.

I have never seen intestinal obstruction following any suspension operation.

The cases in which the Olshausen operation is used, I think, have to be divided into whether or not they are going to bear children. In those that are not going to bear children the method I have just described and the method Dr. Graves described work very nicely. I do not know of any operation for suspension that works

as well. In the cases at the menopause or past the menopause in which I have used the silk ligature, I would say that I can distinctly remember 6 cases of complete prolapse, in one of which the cervix was out six inches. One woman, now 45 years old, had plasties below and the uterus drawn well up from above and fixed half way to the umbilicus with the silk, has had no recurrence and has a good deep vagina at the present time. I examined her not more than two months ago.

It seems to me that there might be certain cases operated upon exactly according to the technic that Dr. Graves described, that might become a fixation and consequently cause trouble during labor. I have delivered several cases, after the Olshausen operation as I do it, and have had no trouble with the deliveries.

One sees recurrences after any suspension operation, regardless of whose method is used. I recently examined a woman who had a recurrence after a modified Olshausen, not the Olshausen Dr. Graves described.

Of course, any operation for prolapse from above must have plastic repairs from below. Dr. Graves did not mention that, but I take it that he, of course, intended to say that very complete plastic repairs be done as the first step in the operation. In the six cases of complete prolapse in which I did it, four of them have since been examined and the result in each instance is good, and there is practically no descent. The other two cases I have not been able to follow up.

In regard to pregnancy after the Olshausen operation, there has been no dystocia, that I am aware of, due to this form of suspension.

DR. C. G. CHILD, JR.—I have never thought favorably of trying to cure one pathological condition by converting it into another, unless I was pretty sure that the second was not as serious as the first. The uterus is primarily a pelvic organ, and to bring it up out of the pelvis and suspend it to the abdominal wall, is taking a liberty with an organ that I feel myself I would prefer to avoid. I cannot feel convinced that a suspension operation which suspends the uterus from a new location on the abdominal wall so far from its normal habitat can be anatomically or surgically correct. I have therefore limited my operation in this condition to the shortening of the round and uterosacral ligaments. My experience leads me still to believe that this is as near the ideal as we have today. Of course in the more advanced types of prolapse plastic work is necessary in rectocele cases to obviate the mechanical factor which in many instances is responsible for the retrodisplacement; that is, the tugging of the rectocele on the posterior wall of the uterus which draws it down into the axis of the vagina. I agree with Dr. Graves that such plastic work should be done where indicated.

Cases beyond the childbearing period, where the uterus has assumed only a secondary importance, are better treated by operation from below as this is attended with less surgical risk and for these cases I prefer the high ventral fixation of Dührssen.

DR. WILLIAM P. POOL.—It is probable that there are as many opinions on this subject in this room as there are persons present, which is pretty good evidence that the ideal procedure for restoring a displaced uterus has not yet been devised, and that those in use do not fit every case.

In the consideration of operative treatment, I think that uterine displacements should be placed in two distinct classes; simple retroversion, and procidentia. In the former condition the Olshausen operation has proved itself of value, as have also the other intraabdominal suspensions which have been mentioned. But in the latter, it is also necessary to consider those structures which normally maintain the uterus at its proper level in the pelvis—the parametrial connective

tissue, and in a lesser degree, the uterosacral ligaments. In every case of downward displacement of the uterus these structures are found to be torn or over-stretched and attenuated, and no operation for prolapse which does not take into account the restoration of these supports can be considered ideal.

Both theoretically and from experience, I feel that it is not wise to depend upon any of the round ligament suspensory operations for the cure of procidentia. Since the round ligaments are inserted into the anterior aspects of the fundus, when these structures are utilized for ventrosuspension, the anterior face of the uterus is brought into apposition with the abdominal wall, and normal anteversion is not affected. Bearing in mind that when the woman stands upright the uterus should be nearly horizontal, it is obvious that such a suspension carries it many degrees out of its normal axis. Therefore intraabdominal pressure which should be exerted upon the posterior surface of the uterus, is brought to bear directly upon the top of the fundus, or in part upon its anterior face, and is constantly acting to push the uterus downward from its new attachment. Recurrences of prolapse that I have had after using the Olsbausen and other round ligament suspensions, have been due to the stretching of the false ligament formed, or to elongation of the uterus itself.

Neither does it seem to me wise to depend upon uterine suspension for the cure of even moderate cystocele, since downward displacement of the bladder is due not only to the descent of the uterus, but also to injury and weakness of the anterior vaginal wall which are commonly associated with it. A plastic which replaces and fixes the bladder at a higher level, and which also obliterates the space occupied by it in its prolapsed position, is usually necessary.

DR. GEORGE W. KOSMAK.—When the matter of inviting the guest to one of our meetings came up in the discussion of the Council, there seemed to be a certain tendency on the part of the gynecologists to claim that the obstetricians had had too many hearings in the meetings of this Society and that the gynecologists should be given a chance to air their views. It is quite evident that the Council has made a success of its choice because we have had more airing of views on this occasion than we have been accustomed to.

I think from the unanimity in expression, or lack of expression, on the part of the obstetricians present that either they are in entire agreement with what has been said by the essayist, or else they feel they do not know enough to dare to discuss it.

I am pleased to note on the part of the gynecologists present that they are always considering the obstetrician in doing these operations and the bringing of pregnancy to a successful termination, which seems to be the cardinal point in the operation. From the standpoint of the obstetrician I am glad to acknowledge that this is borne in mind when we see all sorts of cases come to the delivery table, and unless the uterine wall is put in some impossible position, such as under the bladder, these women manage to come through usually with a little trickery on the part of the obstetrician in dilating a very much stenosed cervix, or if he cannot dilate it by cutting it, or if he finds there is an inertia and the woman does not dilate on account of some other "palliative" operation, he can always do a version and get a living child. So the obstetrician is apparently not in such an unhappy predicament because the gynecologist has devised innumerable operations for ventral suspension—he seems almost invariably to find a way out in a subsequent pregnancy.

DR. HERMAN GRAD.—I have never done the Olshausen operation. When I began to study the subject of suspension I found there were no less than 80 different operations devised, and that they fall into four distinct groups. The

first group are those that simply have the suspension operation of Kelly; that is to say, a peritoneal adhesion operation, with a large number of failures. The second group are those that are typified by the Wiley-Mann operation, where the round ligaments are simply plicated. They have a large number of recurrences of the retroversion. The third group are those typified by the Gilliam operation and the Simpson and Mayo modifications. These operations have a very large number of successes, but they are open to criticism because they create abnormal conditions in the peritoneal cavity. There is the fourth type of operation for retroversion which stands by itself, namely the Bissell operation, which I believe is the best operation that has been devised thus far. However, it is a time consuming operation and takes a great deal of skill to do it.

The Olshausen operation never appealed to me, it creates abnormal conditions. The operation that I devised creates no abnormal conditions in the pelvis. I rely on the round ligaments and uterosacral ligaments in the operation for retroversion of the uterus. The operations can be done rapidly, they do not create anything abnormal, and certainly give excellent results.

I have studied 100 cases of retroversion done by this operation. The round ligaments are shortened by splitting the broad ligament and burying the superfluous portion of the round ligaments into it. It is a subperitoneal shortening of the round ligaments, and it gives most excellent results. The uterosacral ligaments are also shortened.

I was very much interested to note that Dr. Graves puts the prolapse and the retroversion cases together. I believe they are distinctly different types of cases, and I am rather interested to note the large number of successes he gets by simply suspending the round ligament. In my experience I have failed to get results with the round ligament operation in prolapse cases. The prolapse cases divided themselves into two classes, the partial and complete prolapses, and are treated along different lines. A great many of the cases of complete prolapse require hysterectomies. I feel that in many prolapse cases the round ligament should also be shortened after the plastic operation. I find, however, that if I do a combined operation, that is a plastic on the cervix and anterior wall, and then open the abdomen, I get a greater morbidity. If I can avoid this double operation I do so in many cases.

DR. GRAVES (closing).—I am gratified that at least two of you look upon the Olshausen operation favorably.

I agree with what Dr. Taylor has said regarding fixation of the uterus after the menopause. I am accustomed to do this operation in connection with the Olshausen's operation after the menopause, first scarifying the fundus.

I think you have misunderstood me somewhat regarding plastic operations on the vagina in connection with suspension of the uterus. All our cases receive extensive plastic operations, the cervix is repaired if necessary; if there is elongation and attenuation a high amputation is performed.

The cystocele operation which we employ I will not take the time to describe in detail; suffice it to say that an extensive dissection is made at the sides and the fascia is brought together in front in a manner somewhat similar to the principle used by Dr. Baldwin. We do not however consider that the cystocele is cured without the suspension of the uterus, thus elevating the pivotal point.

In answer to what Dr. Matthews said with regard to statistics of the Olshausen operation I would state that this is my first detailed report, although I have recommended the operation in my book.

OBSTETRICAL SOCIETY OF PHILADELPHIA

MEETING ON MARCH 1, 1923

THE PRESIDENT, DR. WILLIAM T. PARKE, IN THE CHAIR

CASE REPORTS

DR. PHILIP F. WILLIAMS read the histories of **Two Cases of Tuberculosis of the Endometrium, and One of a Very Unusual Early Double Ovum Twin.**

CASE 1.—Mrs. N., age twenty-eight, white, married, admitted to the Gynecological Service of the Presbyterian Hospital, October 18, 1922, complaining of pain in the lower abdomen. She stated that the pain had begun six months before and that soon after its onset she had a curettement. There had been no change in her normal menstrual cycle. Three pregnancies had resulted in two full term children and one miscarriage at four months' terminated the last pregnancy about a year before admission. Operation October 22, 1922, showed bilateral pyosalpinx, adherent retroflexion of the uterus and chronic appendicitis. Supravaginal amputation of the uterus with removal of both tubes and ovaries and the appendix was performed. The tubes, intestines and uterus showed the presence of many tubercles. Pathological examination of the specimen showed tuberculosis of the tubes and the myometrium and endometrium.

CASE 2.—Mrs. W., age forty-four, white, married, admitted to the Gynecological Service of the Presbyterian Hospital, November 26, 1922, complained of menorrhagia. Her menstrual cycle had been irregular for two years, being excessive and with shorter intervals and on many occasions clots of varying size had been passed. Married eleven years, sterile. Physical examination showed some moist rales at the left apex. There was a slight epitrochlear and cervical adenitis. Curettement under gas-oxygen on November 28, 1922, removed endometrium which was reported by the pathologist as showing tuberculosis. There was marked hyperplasia of the endometrium, especially of the glands. The glands were somewhat irregular in outline. Some piling up of the lining epithelial cells, but no breaking through the basement membrane. A few tubercles and an occasional giant cell were seen.

Tuberculosis of the endometrium is rated as being second in frequency in the pelvic structures, tubal infection only exceeding it in frequency. The specimens show clearly the tubercle formation and the histories show the widely variant mode of onset, one in conjunction with widely spread tuberculosis of the peritoneum and pelvic structures, and the other an infection probably spreading from a pulmonary lesion.

CASE 3.—This specimen was removed from the uterus after supravaginal amputation. The patient a Polish woman, aged twenty-four years, had had two children at term and no miscarriages. Her menstrual cycle had been regular after the birth of the last child. On January 12, 1923, being four days overdue, she injected a mixture of turpentine and soap suds into the vagina and possibly into the cervix. This was followed by intense abdominal pain, some bleeding and a condition of shock. She was transferred to a hospital, and treated for the shock. After some days the pain became less, the bleeding ceased and bimanual examination showed a retroflexed and adherent uterus and marked tenderness of the adnexa. It was

believed that the patient had either aborted or was not pregnant. Supravaginal amputation of the uterus with removal of both tubes and ovaries was done. On opening the uterus a decidua was found. This was sent to the Carnegie Institute of Washington, Department of Embryology, and Dr. George L. Streeter, the director, reports that it is a specimen with double twin ovum of probably more than four weeks, developed normally and that a spontaneous abortion would doubtless have resulted.

DISCUSSION

DR. BARTON COOKE HIRST.—I once saw an interesting case of a woman delivered at term in the University Hospital, who developed symptoms of infection. Exploration of the uterus on account of its unusual size and curious character of the discharge revealed a large quantity of thick grayish exudate, which was found to be due to tuberculosis of the endometrium with enormous hyperplasia of the decidua. The woman died within a few days after the onset of the symptoms, before I received the pathological report. If I had had the report earlier I think I would have done a hysterectomy. The woman died I think of septicemia from the enormous necrotic mass in the uterus.

I learned at a recent visit to the Carnegie Foundation for Embryology in Baltimore that they were able to state as the result of observations on 4000 specimens, that the average retention *in utero* after embryonal death was six weeks. In reviewing clinical cases before and since it appears that this statement is borne out by practical experience. The symptoms of the average abortion would indicate the death of the embryo on an average six weeks before its expulsion. The attempted preventive treatment therefore, in the majority of cases of so-called threatened miscarriages must necessarily be futile. The embryonal death is evidenced by the first visit of symptoms which continue till the dead ovum is expelled or extracted. Is not this fact also an argument against the expectant treatment of all abortions?

DR. EDWARD A. SCHUMANN.—I have the impression that in and about Philadelphia, at least, pelvic tuberculosis is being seen less frequently. That impression cannot be supported by statistics because I have made no research recently but a series of cases studied some eighteen years ago, revealed the fact that in some 200 pus tubes studied at the Gynecean and University Hospitals, the cases being from the service of Dr. Baldy, Penrose and Beyer, 17 per cent of all purulent tubes showed evidence of tuberculosis if serial sections were made. We must bear in mind that tuberculosis of the tube is at times extremely focal. I have made sections of tubes and found a tuberculous area occupying half a centimeter and the rest apparently free from infection. In accord with Dr. Williams I feel we do not get many reports of tuberculosis from the laboratory in recent years.

DR. F. HURST MALER.—I operated upon a similar case some years ago. It was a fibrous uterus the size of a child's head, which unfortunately for the patient was not diagnosed until after its removal. I say unfortunately for the reason that a large cigarette drain was left in with the result that a fistulous tract remained which never closed and which I also believe was largely responsible for the woman's death some six months later.

It is astounding the amount of tuberculous pathology that the individual gets rid of, providing it is uncontaminated by other organisms. I saw a patient the other day whom I had operated upon several years ago for tuberculosis of the uterus, tubes and ovaries, and right parametrial tissue. So extensive was the in-

vovement that on the removal of the mass, the ureters and pelvic vessels were uncovered and the bladder, which was thickened and adherent to the uterus, was broken into. The cervix was left to reinforce the sutured bladder wall and the abdominal cavity closed without drainage. The patient had a stormy convalescence but made a good recovery. A week ago she was in better health than she had ever been and had gained forty pounds in weight. A careful pelvic examination failed to show any evidence of disease. The cervix was small and mobile. It was similar to the ones we so frequently see following a subtotal hysterectomy for fibromyomata.

Our present splendid results in the treatment of tuberculosis of the genital organs are undoubtedly due to the facts that we know it is not an infrequent disease and recognize its occurrence earlier and that we do not include drainage as a part of our operative technic.

DR. COLLIN FOULKROD presented a paper entitled **A Modification of Axis Traction Forceps.**

For the individual operator each forceps devised offers some difficulty.

With instruments that fit the hand an operator can do much cleverer work.

In the existing forceps there have been some few points which in my experience have needed correction.

First—The shanks of the Simpson forceps are unnecessarily broad and will often start the cracking of the mucous membrane of the perineum before traction can be performed. This alone can be avoided by cutting the perineum.

We believe that many of the lateral vaginal tears are started by the pressure of these wide shanks against the wall just under the bladder.

We have found no better cephalic curve than that of the Simpson forceps and with such a curve and the shank attached as in the Tucker-McLean forceps we have secured in our opinion a safer instrument.

The lock of existing axis traction forceps is a snare and delusion and impossible to close quickly and always in the road. We have therefore used a large button to hold the notch of the second blade and have placed on top of the shank a lock with a shoulder on both sides which can be used in *somewhat* the same fashion as the Elliott set screw to prevent active pressure on the child's head.

The traction bar as used on the Dewees forceps has given me very good results.

This forceps has been in use for over a year and has solved some of my problems of forceps delivery.

DISCUSSION

DR. B. C. HIRST.—I know the Dewees forceps very well as I helped Dewees to design it. In fact the main features I may claim to have suggested. The first model he brought me was so imperfect that I refused to recommend it. There was no provision for oblique application. I showed him how this defect could be remedied and then much to my chagrin, he patented the idea. If the instrument makers had correctly copied the instrument I lent Dewees it ought to be a perfect reproduction of the Simpson forceps and ought not to inflict injury on the fetal head. I lent Dewees the Simpson forceps I bought in Vienna from an instrument maker who had received the model from Sir James Y. Simpson. The lock on the original Dewees is awkward and is, I am glad to remember, a part of the forceps I did not suggest.

DR. NORMAN L. KNIPE.—I think that is a distinct advance over the shank of the ordinary Dewees or Simpson forceps and I am perfectly sure that it is

going to be the last improvement used on forceps because the next generation is going to do version for every malposition of the head for dystocia or obstruction. I am perfectly sure of that because we won't need any forceps.

DR. RICHARD C. NORRIS.—I may say that I have a Dewees forceps with a similar lock, except it has no shoulders. I had the old lock taken off and replaced with a lock like that on the Tarnier forceps. My trouble with the Dewees lock is that it repeatedly tears gloves. As a matter of fact the less one uses the compression lock the better. Now as to the shaft of this instrument and its reduction in speed and to ironing out the vagina. The latter is a term describing submucous lacerations of the vaginal outlet. Dr. Foulkrod has spoken of tears beginning at this point and going backward; it is a belief that these tears begin above and come down. I have never observed traumatism from the shank of even the Simpson forceps. There is danger of putting on the forceps too soon and of pulling too quickly and thus tearing the upper third of the vagina. It is regarded as a great safeguard to the lower third and outlet to do a central episiotomy. I never deliver primiparae with forceps without doing this operation if injuries of the outer or lower third of the vagina seem imminent. That does away with producing trauma by the forceps at the outlet. I don't believe any man can iron out the vagina in a reasonably short time and have the baby's head come through without lacerations of fascia and muscles under the mucous membrane. Nature does not do it. How can we improve upon her more gradual process? The cutting operation is more scientific, so I think the point Dr. Foulkrod has made about not producing traumatism is a questionable one. The lock is an improvement on the sliding groove arrangement on the latest model and I practically do without a lock in most cases. In the Simpson forceps we do not have any lock. Difficult forceps cases now are almost entirely posterior occiputs. A great deal of skill and experience is required in many of such cases. They are perhaps the most difficult forceps operations encountered since we have an abandoned high forceps applied to the unmolded and partly engaged head at the pelvic inlet.

DR. B. C. HIRST presented the following case reports: (1) **Unusual Hydronephrosis with a Pyelogram of the Other Kidney.** (2) **Uterus Bicornis Duplex with Enormous Unilateral Hematocolpos from Retention of Menstrual Fluid for at Least Seven Years.**

CASE 1.—Mrs. R., Age twenty-five; married fifteen months; never pregnant. Menstruation normal. Chief complaint, pains in lower abdomen and back; worse on left side; not constipated; urine normal; swollen abdomen. Examination showed a left-sided cystic tumor extending from four fingers above the umbilicus to the pelvis, reaching considerably past the median line to the right of the abdomen. The diagnosis was ovarian cyst but at the operation it proved to be enormous hydronephrosis. The kidney was reduced to a mere shell with walls not an eighth of an inch thick. It seemed useless, therefore, to conserve it and it was removed, by a transperitoneal nephrectomy. The other kidney has since proved perfectly competent.

CASE 2.—Mrs. N., August 29, 1922. Age twenty; married one year; pain on first menstrual day. First noticed pain between 18-19 years, with two severe exacerbations in June and July; the last supposed to be due to electric fan on a hot night at and after period, about August 19, during period, three days before entering hospital, pain disappeared. Operation disclosed a uterus bicornis duplex;

hematocolpos in atretic vagina of right side; no distention of either uterine cavity. Fundus of both horns excised with interstitial portion of tubes; latter fixed to posterior wall of uterus (artificial sterility), hematocolpos evacuated of a quart of menstrual blood; thoroughly washed out; opening sewed to abdominal wall; 12 days later lower end of right vagina opened; sinus in abdomen allowed to close; vagina drained for five days. Examination, October 2, 1922: Result perfect; abdominal sinus closed; both vaginal orifices ample size.

The reason for excision of interstitial portions of tubes and their deflection was to prevent a possible pregnancy in either ill developed horn, with likelihood of rupture if ovum continued to develop.

DISCUSSION

DR. EDWARD A. SCHUMANN.—In regard to this second case of Dr. Hirst's, which represents the arrest of development, I can appreciate the difficulties because on one occasion some years ago I found a case of incomplete abortion with considerable hemorrhage. As the hemorrhage persisted after the temperature dropped, I thought it proper to do enrettage and did so, sending a small amount of scraping to the laboratory only to get the report that it was normal endometrium without evidence of pregnancy, which disturbed me as the patient continued bleeding. I enretted the wrong horn of a bicornate uterus, the one horn was pregnant, the other one subsequently being operated upon by another and wiser surgeon. The other case of Dr. Hirst's reminded me of one in the Frankford Hospital yesterday. One of my colleagues was about to cystoscope a woman with pain and tenderness in the left kidney region. The cystoscope entered the right ureter with difficulty and the left ureter not at all. There was apparently no disease in the ureteral orifice. Later there was found to be a ring pessary in the vagina. When the ring pessary was removed the left ureter was entered and careful examination disclosed that the the ring pessary had caused distinct fibrinous exudate about the left ureter and had started a very definite hydronephrosis.

DR. F. HURST MAIER.—Both of Dr. Hirst's cases carry with them the value of rectal palpation as a routine procedure in gynecic diagnosis. It is often the crucial factor in enabling us to determine the presence or absence of an ovarian cyst.

In the first case I believe it would have been much safer if not quite as scientific if he had refrained from introducing a catheter into the remaining kidney; especially as the urinalysis had demonstrated that it was functioning normally.

It has been my experience that hematocolpos can usually be diagnosed through the rectum. There are exceptions to all rules, however, and if the character of the pathology is not recognized until after the abdominal cavity is opened I am inclined to believe that it would be better to first complete the abdominal work and finally empty the collection of blood through the vagina below.

DR. B. C. HIRST.—The patient menstruates regularly, half the discharge coming from the right and half from the left horn. When I first examined her there was an accumulation on the left side of nine years of menstrual blood. She menstruated apparently normally and regularly from the patent side. The large cystic tumor, I must confess, I did not suspect the true condition.

I would say in reference to the criticism of the pyelogram, if done properly there is no risk about it whatever. It seems to me always a desirable thing to be sure that there is not a bilateral hydronephrosis. There was in fact a slight hydronephrosis and a little hypertrophy but no more than one would expect in a kidney doing double duty.

We are all aware of the adequacy of a single healthy kidney. I have under observation now patients in whom I did nephrectomy twenty years and more ago, who are in perfect health.

DR. W. WAYNE BABCOCK read a paper entitled **Resuscitation in Abdominal Surgery**. (For original article see page 179.)

DISCUSSION

DR. SCHUMANN.—This dramatic paper impressed me, particularly the efficiency ratings. If I should rate as inefficient a nurse who failed to produce a perfectly acting intravenous apparatus within fifteen seconds and find that this nurse that very morning or the night before had been put on operating duty, I would probably be doing that nurse an injustice. If Dr. Babcock has an operating room team of nurses and assistants I could see where his efficiency ratings would come in. There are two efficiency ratings he did not mention. I think the operator who does not use proper anesthetic and does not choose the proper anesthetist and the operator who does not recognize impending respiratory failure, should be rated as extremely inefficient. The other point which impressed me is the amazing amount of operative work which must be done in these institutions to get so many of these respiratory and cardiac failures on the table. In the institution with which I happen to be connected such occurrences are exceedingly rare. I can recall only one respiratory failure with death on the table. I would ask Dr. Babcock in about what proportion such accident occurs and then I could draw certain conclusions as to whether anesthetic or anesthetist had anything to do with it.

DR. COLLIN FOULKROD.—I am moved to comment on two things very forcibly brought out by this paper: the first is that we, many of us, have an anesthetist placed to our hand in our own hospitals not properly trained and I can hardly agree with Dr. Schumann that such things are rare. It is my experience that the resident physician often does not know, and it must be brought out, that the pulse is no guide in such extremity. The patient may have a full, bounding pulse and no tidal air. There should be some way of internes being brought to us with a little better training in anesthetics.

DR. RICHARD C. NORRIS.—In asphyxia of new born infants adrenalin is very valuable as a stimulant where cardiac pulsations are feeble or have almost entirely ceased. The frequency of this emergency does not come, of course, to the gynecologist, as it does to the general surgeon. I would ask how much of this is due to spinal anesthesia? I suppose Dr. Babcock has had experience with such cases under other kinds of anesthetics. We cannot as gynecologists and obstetricians compare our experience with those of the general surgeon in his clinic, where there are so many more dangerous cases that come to operation. I can well appreciate the necessity for the prompt and precise technic he has described.

DR. NORMAN L. KNIPE.—It is certainly true that our hospital technic, for instance, the putting of a nurse in the operating room for the first time and letting her do the work as well as she can, the work of an experienced nurse, is all wrong and if a paper like Dr. Babcock's can call attention to that it will do good. We ought to have training in first aid, we ought to have drill as he suggested to make this move with greater facility. We do not always get warning of respiratory failure and I have seen deaths occur suddenly on the table.

DR. BABCOCK (closing).—We all recognize the importance of an efficient anesthetist, but this is a phase of the safeguards with which we should surround our patient without the scope of the paper. It does not seem too much to ask that each operating room should have a reasonably safe and efficient emergency technic, especially when only a simple drill and inexpensive apparatus are required. In our clinic we have a small emergency tray and each nurse who comes on operating room duty, learns to prepare and have it in readiness. If the knife, needles, and other metal parts are made of non-corrosive material, they may be sterilized and resterilized without deterioration. In nearly all hospitals there is a permanent senior operating-room nurse, and while pupil nurses come and go, this senior nurse should at least be capable of showing the pupil nurses as they enter the operating room how this emergency tray is arranged and also the nurse's duty in an emergency. A flask of saline solution, kept during operations at body temperature with the little tray is all the apparatus required. To bring the prepared tray and the salt solution should not take twenty seconds, and before the assistant has the needle in the vein, the filled funnel and adrenalin are at hand. There should be no difficulty and very little skill is required of the nurse.

You say, "collapse on the operating table is a very unusual emergency." Perhaps it is, but if it occurs only once in fifteen thousand operations, and if an occasional drill will enable you to save that one life, it is well worth being prepared every day in the year. We have fire drills in our schools, yet how many of our schools burn down each year? But the emergency is not so uncommon. I daresay every one of you can recall at least one life that might have been saved. From a few surgical acquaintances a few years back I collected nearly forty deaths under anesthesia, which was roughly, about one death to every five hundred operations with which they had been associated. I suppose my personal experience has been unusually rich in these tragic events, for I can recall twenty patients who had respiratory and circulatory failure on the operating table. These did not include the slight cases which are not infrequent, such as a child under operation for tonsils or hair lip that has to be inverted and shaken a few times before the circulation is resumed and the operation completed, or other cases of transient collapse under ether, chloroform or gas, or the deaths from pure traumatic shock. Doubtless the number I have seen has been increased by the use of spinal anesthesia, particularly in the early days when we attempted to operate by this method upon nearly every shocked or moribund patient who entered the hospital.

For example, from 1904 to 1914 we had repeated experiences with measures for resuscitation and nine patients died on the operating table. From 1914 to 1923 by avoiding spinal anesthesia in the intensely shocked, desperately ill or apparently moribund patient, we had no deaths from the intradural injections, although a small number of patients required resuscitative measures, and one from zinc chloride poisoning was resuscitated with great difficulty and died a few hours later. During this time, however, I saw three deaths, two from ether and one from nitrous-oxide-oxygen in patients who were apparently good surgical risks and who were having operations not considered dangerous. At least two, possibly all three of these patients would have recovered had the emergency measures described in the paper been promptly followed.

Nearly thirty years ago as an interne, I had an impressive illustration of the importance of accurate and systematic resuscitative measures. From a poorly applied tourniquet, a robust police Sergeant, shot through the knee, bled to collapse on the operating table in the presence of a room full of physicians who were discussing methods of amputating the leg. Despite the pulseless condition of the patient the operation was started while the doctors present whipped out

hypodermics and each independently attempted to stimulate the patient by his own plan. Some used strychnine, others digitalin, others atropine, while one old surgeon, obviously from long dependence, had glasses of whiskey arranged about the patient for convenience in filling his syringe, and repeatedly circled the patient, now injecting the neck, then the arm, then the body, then the leg and then returning by a series of injections upon the other side of the patient. No one knew what stimulation this patient received, but it is probable that he had thirty or forty hypodermic injections within ten minutes and the operation was concluded as the patient breathed his last.

By a systematic technic, we do the thing that is essential and avoid wasting time on nonessentials. There is one predominant cardiac stimulant for the emergency and that is, the intravascular use of adrenalin. Nothing compares with it. The slowly acting digitalis is not to be considered. It is a foolish diversion to inject anything under the skin of a man practically dead. There is one great associate for adrenalin and that is cardiac massage, (either may fail alone). The second thing is the use of artificial respiration in a way that will be efficient. We cannot conveniently use the methods employed when a man is shocked by an electric wire, or pulled out of the surf, and we must act quickly and make sure that our efforts move the air in the lungs. Muscles and bones will live for hours without circulation, the cortex of the brain, but seven minutes. After this time, although we can make the patient spontaneously breathe and cause his heart to resume beating, he will simply go on in a vegetative way for a few hours, or at most a few days, and then pass out without regaining consciousness. Knowing this is to know the importance of quickly doing the few things that are essential and of always being prepared.

JOINT MEETING OF THE NEW YORK OBSTETRICAL SOCIETY AND THE OBSTETRICAL SOCIETY OF PHILADELPHIA

APRIL 5th, 1923

THE PRESIDENT, DR. WILLIAM E. PARKE, IN THE CHAIR

DR. WILLIAM E. PARKE.—Philadelphia has been entertaining a considerable number of members of our profession during the week and it is my pleasure tonight to welcome the members of the New York Obstetrical Society. We hope you enjoyed the day. I will ask your chairman, Dr. Pomeroy, to address us.

DR. RALPH H. POMEROY, NEW YORK.—We are going to present to you through Dr. Humpstone some of the troubles we have been puzzled over, both by commission and in the open, and because we felt that we had been confronted with various problems of sociological character that the public is taking up in connection with our essential work, the consideration of obstetrics in particular, and there are numbers of questions that we still do not know how to answer. We certainly hope that you will answer some of them for us. We don't even yet know why it is that legislators and governing bodies have proclaimed with emphasis that one cannot transport or use beverage alcohol and there doesn't seem to be any substantial movement on foot to abolish that type of legislation and yet if we consider the agitation that is now on hand to abolish the transportation of other questionable articles of merchandise, we wonder where the consistency comes in and we expect you to solve that problem for us.

DR. O. PAUL HUMPHSTONE then read his paper entitled **The Sociological Responsibility of Obstetrics and Gynecology.** (For original article see p. 149.)

DISCUSSION

DR. EDWARD P. DAVIS.—No more valuable and interesting paper has come to my knowledge for a long time than that of Dr. Humphstone's and the time is ripe for such studies and, I trust, for some action. The responsibility of our profession for public welfare should be acknowledged by us all and in considering ways in which the profession may exercise influence may I draw your attention to the fact that in foreign countries at times physicians have exercised by membership in legislative bodies very great influence. We have only to think of Porro and Mangiagalli as Senators of the Italian Kingdom to know that obstetricians and gynecologists have done what they could for their country. We have only to refer to the fact that a considerable number of medical men are in the English House of Commons to appreciate the superiority of England in dealing with the midwife and some other important problems. There is no reason why an obstetrician and gynecologist should not be in the legislative body of his State and New York has sent a Senator to the United States Government.

In the State of Pennsylvania we have at the present time an illustration of the danger of vicious legislation. The chiropractors are well organized in this State and the osteopaths have before the Legislature a bill which will give to them the complete practice of medicine, of surgery, of obstetrics, and of the administration of medicinal remedies in addition to their peculiar manipulations, and, unfortunately, this bill goes back by political intrigue to certain members of a high medical board. That is a danger which threatens us in our State and I imagine you in your State have your own troubles.

That the medical profession should be the authoritative body on birth control goes without saying, and it is a part of the mental upset and hysteria of the present that those persons who most agitate to bring themselves into notoriety are taking up the question oftentimes in a miserable and disgusting way. So far as birth control to prevent excessive population goes, we must remember in this country there are two factors preventing increase of population which have nothing to do with reproduction: one is the resistance of organized labor to immigration and the other is the desire of large corporations to import ignorant and foreign labor to support their purposes financially. This is a political condition which directly affects the size of the population of this country. We have long harked back to the phrase "melting pot," but you are aware that some of our most distinguished students deny the fact that human races ever melt. The negro is the same as he was in pre-Biblical and prehistoric days. It is considered a question whether any person not born and bred for a generation in this country will after a considerable lapse of time become racially a Caucasian. Undoubtedly we must consider that a question in the matter of population.

There is another factor of extreme importance, that is the factor of economic conditions. We all remember Continental Europe at the time of large standing armies, when European Governments very frankly encouraged promiscuous reproduction and to prevent criminal abortion cared for children so produced. We, I think, would not be willing to have develop in this country any condition which forbade marriage, because of lack of money, and which encouraged promiscuous reproduction, throwing the burden of the care of these children on the State. If we are to offset and guard against such a predicament we must make economic conditions such that the working man can obtain a living, comfortable wage and

marry early and live comfortably, and there can be no greater service rendered to the State than fostering such economic conditions. It is true that all the great corporations take seriously into consideration the health of their operatives, and that they encourage among the young and industrious men and women marriage and try to make such families comfortable afterwards.

The dangers and the risks of contraception have well been set forth. It is, however, the duty, I think, of our profession first to acquaint women with physiological conditions concerning conception, then to advise such means as may safely and simply be employed, with the distinct understanding that none of these means can be absolutely relied upon. To draw upon the credulity or upon the false sense of security of those who practice contraception is certainly unworthy of our profession.

The question of sterilization in a scientific manner is better possibly than the question of contraception and there is one class of patients who I find appeal strongly to us all, that is the hard working wife of the artisan, the woman who has already produced three or four children, she and her husband have reached the limit of earning capacity, the woman shows the result of repeated parturition and hard work and comes to us for advice and care, and there I believe we may properly terminate the possibility of conception by some proper surgical means, leaving ovarian tissue and conserving the general health of the individual. If that is done with the written consent of husband and wife we are rendering, I believe, a valuable service to humanity.

A lack of beds for hospital maternity cases is a crying evil in this, as other states, and a good deal has been done here to improve maternity service in hospitals by a former member of the American Gynecological Society, Dr. Baldy, who during his active professional life raised the standards of our hospitals and refused to recommend a hospital for resident physicians unless that hospital provided adequate maternity training for the resident, and the result of that effort was a very decided improvement in the maternity service of this State. As you and we build better roads, as Uncle Henry lowers the price of the driver and puts another spring in the back seat, it will be more and more possible to take complicated cases of confinement in our States and rush to hospital in time to avoid obstetric catastrophe. We have in this State at least fifty adequate hospitals, you probably have more, and the problem should be solved somewhat in that manner.

The essayist has very wisely drawn attention to the question of obstetric attendants and may I suggest to all of you who are interested in the problem of nurses that that today is the vital problem of nursing in this country. The trained nurse is expensive. There are various things drawing away from private practice the skillful nurse—public health work, school work, community work is rendering much less the number of nurses available for the individual patient in the private house, and it is the problem of the day to train, by suitable method and under local and State and municipal restriction, a certain number of persons of at least average intelligence who can carry out the essentials of medical and surgical care at a very moderate cost. Your obstetric attendants will come in line with that very much desired solution. We can only say that if this Republic is to continue in prosperity and to prosper that the question which is vital today is the care of its population. Not only the care, but the education of its population, and one may say that a successful education is that training which fits its possessor to follow, with keen and loyal interest, some honorable pursuit in which he can gain an honorable living, and shall in some way contribute to the welfare of mankind, and this specialty, honorable and ancient as it is, can do no better work than that so ably outlined by the essayist.

DR. BARTON COOKE HIRST.—I listened naturally with great interest to this paper, sir. We must all agree with the essayist as to the necessity of prenatal care. We have all seen the advantage of it. In this city one advantage is shown in the marked lowering of the incidence of eclampsia. My interne yesterday called my attention to the fact that we have had fewer cases in the University Hospital during the last winter than ever before in the history of the Institution. I am sure the preliminary care of pregnant women has been the reason.

As to birth control, I think the attitude of physicians should be not to encourage this movement nor to give any information about it except in a limited number of cases for medical reasons. My custom has been to point out the disadvantages of all the methods commonly employed, almost all detrimental to a woman's health, usually resulting, if continued long, in sterility in the woman and possibly impotency in the male. That threat has a potent influence on the man.

The underlying idea of the essayist, it appears, is how can obstetrics best contribute to the welfare and safety of our women? There is one thing we can do, with that end in mind, that has not been mentioned. In an analysis of my private case books, comprising some 15,000 names, or more, I found that over 50 per cent of women come to my office with injury of the birth canal and 10 per cent of them have retroversion of the uterus. These two conditions, constitute 60 per cent of all the diseases of women; no woman should have either of them, if her physician is competent.

If we do our work properly we can wipe out, by a proper education of medical students and the profession, the great majority of the diseases of women and that seems to me one of the most important functions of our branch of medicine at the present time. Another duty we owe to the public is to teach our students how to deal with the complications of labor, by ample clinical instruction. We all remember the recent address by Sir Arthur Newsholme in which he proved that the prenatal clinics of Great Britain did not diminish the mortality of the new born to as great an extent as the proper management of labor would have done. In other words the greatest loss of infantile life was due to mismanaged labor and its complications. If we concentrate our efforts on the better education of medical students and general physicians, we will lower the incidence of diseases of women until they almost disappear and will diminish the appalling wastage of human life before, during and shortly after birth.

In our special work as in the other branches of practice, preventive medicine is the field for future progress.

DR. EDWARD A. SCHUMANN.—As most of our guests are compelled to leave I must of necessity forgo the opportunity of discussing Dr. Humpstone's delightfully scholarly and idealistic paper. I should like to debate the matter—birth control. This is a procedure which has existed in the country for many generations and is steadily increasing. We know that birth control is exercised not only by those we would advise for or against, but those of our inhabitants whose offspring are most necessary for the high type of citizen which he insists shall be the population of the future. I am not convinced that mere numbers of births predicate an advancement of the race, but feel rather that the earth's population is sufficiently numerous to permit of selective breeding.

DR. DAVID LONGAKER reported a case of **Labor Complicated by Congenital Diaphragmatic Hernia, with Autopsy Findings.**

Mrs. D. was admitted to the Kensington Hospital for Women at 7:30 P. M. (6/19/22). She was pregnant at full term and according to her menstrual history should have been due 6/17/22. She had had some slight pains for a few hours

before admission and on admission she had some very weak pains at long irregular intervals. She was not in active labor.

At 10:30 P. M. (two and one half hours after admission) examination showed a frank breech presentation of the L. S. A. type. The os was dilated one finger-breadth. At that time the pains were weak, infrequent and irregular.

The following morning the patient was having a few pains as before but none of any strength, duration or efficiency. At 1 P. M. 6/20/22 the patient was given two ounces of castor oil and this was followed in one and one half hours by a magnesium salt enema. At 3:30 P. M. she was given pituitrin minims iii, intramuscularly. She immediately developed strong pains with complete dilatation of the os at 4:30 P. M. The membranes ruptured spontaneously at 5 P. M. and her pains were strong and very frequent.

At 6 P. M. the patient was taken to the delivery room. Under chloroform anesthesia Dr. Longaker delivered the baby easily by breech extraction as in Potter's method. Immediately on delivery the child seemed in good condition. It gaped and strained and attempted to breathe but for some reason could get no air to enter the lungs. Finally intubation of the larynx was done. The pulmotor was also used but without avail. The child's heart during all this time continued to beat strongly and did so for fifty minutes after which time it stopped and the child was declared dead.

Permission for autopsy was obtained.

The mother's condition was good all the time during and following delivery. She had a slight tear of the fourchette not requiring repair. The placenta and membranes were easily extracted whole. The following puerperal history of the mother was uneventful.

The autopsy report showed:

Evidently a well developed full term baby weighing 8 lbs. 7 oz., 21½ inches in length. No gross abnormalities apparent. The left lobe of the liver was found occupying the epigastrium and the space to the right under the lower costal margin. The right side of the diaphragm was absent except for a small thin strip about one-half inch in diameter extending along the anterior parietal region at the level of the eighth costosternal juncture. Behind this narrow strip the right lobe of the liver projected being bent upward and outward to about a right angle with the left lobe of the liver.

This right lobe of the liver occupied nearly the whole area of the right pleural sac and extended up to the level of the first rib.

Behind the liver a greater part of the intestines also extended up into the pleural sac on the right, there being found in this position the appendix, the cecum, the ascending colon and about one inch of the transverse colon, also about three fourths of the small intestine as near as could be judged.

The pleura on the right posterior wall extended downward continuously without break or irregularity over the right kidney and was then reflected up and forward being attached as mesocolon.

The right lung was small and compressed medially. The heart was displaced to the left. The left pleural sac was normal to all appearances. The left lung was normal but was compressed to the extreme left. The thymus was normal but was pressed upward and to the left. The left diaphragm was apparently normal, most other hernia cases reported have occurred on the left side.

Department of Reviews and Abstracts

CONDUCTED BY HUGO EHRENFEST, M.D., ASSOCIATE EDITOR

Selected Abstracts

Abortion

Benthin: The Indications for Induction of Abortion. *Therapie der Gegenwart*, 1921, lxi, 324.

Königsberg University Clinic statistics show that induced abortion is twice as frequent as it was before the war. While he regards this as largely due to criminal measures, Benthin feels that therapeutic abortion is often performed on insufficient grounds. In only 58 per cent of 78 cases referred to the clinic for abortion was it found necessary to interrupt the pregnancy. Von Jaschke is quoted to the effect that of 385 cases of induced abortion, he regarded 278 as unjustified. In the Königsberg clinic only 210 therapeutic abortions were performed in 23 years; the mortality was 7.14 per cent; the operative interference is charged with 3.81 per cent.

Indications referable to the ovum and maternal genitals are relatively few: fixed, incarcerated, retroflexed uterine; in carcinoma of the uterus if the interest of the mother demands radical procedure; death of the ovum without maternal toxemia calls for intervention only when medical observation cannot be had. Abortion is called for in case of prolonged bleeding (hgb. 50 per cent or lower), placenta previa, hydatidiform mole, acute hydramnios.

Toxemia of pregnancy often leads to unnecessary abortion. Improvement often follows dietetic measures, change of climate, etc. Abortion is indicated when despite these measures there appear cerebral symptoms, rapid pulse, high temperature.

Heart disease: a critical review convinces Benthin that this complication is unduly feared, and that the total mortality of heart disease complicating pregnancy is 2 to 4 per cent. In the absence of decompensation and myocarditis, not even mitral stenosis calls for abortion.

Tuberculosis: laryngeal and progressive pulmonary cases must not be temporized with; but latent tuberculosis, and manifest cases that are not progressive, will bear observation. In only half of even manifest cases is an unfavorable influence to be expected. It is to be noted that neither positive sputum, loss of weight, short fever, nor even an hemoptysis alone indicates abortion.

Kidney disease: albuminuria is frequently physiological. This condition may be engrafted upon a nephropathy, acute or chronic. Acute nephritis yields to the internist's treatment; chronic nephritis requires observation to anticipate apoplexy, uremia, and cardiac complications, but prophylactic abortion even in this disease is unjustified. Abortion is absolutely necessary in exacerbations in the early months, with decompensated heart, uremia, retinitis, and increasing edema. Pyelitis seldom requires abortion.

Diseases of metabolism and internal secretion: abortion is indicated only in such cases of Basedow's disease which are not judged good risks for thyroidectomy. Pregnancy increases the likelihood of diabetic coma, but abortion is indicated in

diabetes only when dietetic treatment fails to check the sugar excretion, or acidosis or increasing albuminuria develop. Of hepatic diseases, only acute yellow atrophy calls for abortion; as do also the blood diseases, leukemia and pernicious anemia.

Nervous and mental diseases: these are seldom affected adversely by pregnancy and conversely, abortion is seldom of benefit. It is in less favor than of old in treatment of chorea. Epileptic attacks are sometimes more frequent in pregnancy; abortion is indicated only in marked increase in frequency, with increasing psychic disturbances, and above all, in the dangerous status epilepticus. Only the severest cases of polyn neuritis, involving the optic nerve, call for abortion. In the psychoses, abortion comes into question only in the severe depression states. This holds also for dementia precox, in which it is called for only in relapses.

Is the physician to consider any but medical indications for abortion? As to social indications, no. As to eugenic indications, the time is not yet ripe. As to rape, the question is evaded as follows: "Our experiences consequent to the Russian invasion confirm the already oft-expressed view, that pregnancy after rape is a rarity. Whether rape has occurred or not is for the magistrate to decide."

RAMSAY SPILLMAN.

Phillips: The Induction of Abortion. *The Lancet*, 1921, ii, 266.

The article is based upon 57 instances of induced abortion which the author has performed in 35 years of private practice. In all of these cases a consultation was held, and complete agreement was reached that artificial abortion was not only the best but indeed the only course to pursue to save maternal life. No maternal mortality occurred in the entire series of operations.

Eighteen were performed for albuminuria. All had been treated in the usual way by rest, diet and the various drugs employed in these cases without improvement. In two cases of glycosuria the induction was carried out because of the rapid progress in the already existing disease, emaciation and thirst being the two marked symptoms.

Eleven patients were treated by induction of abortion because of uncompensated cardiac disease. There was double aortic disease in 4 cases, aortic and mitral stenosis in 5 and mitral regurgitation in two. In all of them relief of symptoms followed the operation.

The author found uncontrollable vomiting of pregnancy to be one of the commonest reasons for induction of abortion, occurring in 15 of his 57 cases. In all of these cases every kind of local and general treatment was tried. In one case abortion was induced because of acute salivation, measurement on two occasions showing a secretion of over two quarts of saliva in 24 hours. Sleeplessness and rapid loss of flesh were prominent features of the case and finally, commencing mental disturbance rendered induction necessary at the tenth week.

One case required induction of abortion because of a severe chorea, where mental symptoms developed about the eighteenth week of pregnancy.

In all six placenta previa cases induction was carried out because of profuse hemorrhage, this urgent symptom occurring without warning.

In three cases he induced abortion because of carcinoma of the breast.

The author advocates early induction of abortion (before the tenth or twelfth week) in certain cases of mental aberration but believes it difficult to generalize on the treatment of these cases as each should be considered on its merits.

In other conditions as pulmonary tuberculosis, general tuberculosis, epilepsy, conditions leading to paraplegia, etc., he does not believe induction of labor is necessarily indicated.

NORMAN F. MILLER.

Wiegels, W.: *Artificial Abortion, in Respect to Social and Eugenic Considerations and to Rape*. Therapie der Gegenwart, 1921, lxii, 461.

Wiegels laments the remarkable incidence of criminal abortions in Germany, which it seems to him increases "in direct proportion to the sinking morality and staunchness of the German people." The physician, as guardian of the public health and weal, must lend his aid to measures best designed to combat the practice: education as to the consequences of abortion, moral and ethical considerations, extension of religious influences on the one hand; combating misjudgment in therapeutic abortions, suppression of the means for producing abortion, preference and better incomes for large families, etc., on the other.

Statistics on the incidence of criminal abortions obviously are unreliable. Estimates by Bumm, Döderlein, Opitz, and Winter vary from 300,000 to 500,000 occurring annually in Germany. As for the proportion of criminal abortions in this number, Wiegels observes that out of 15 patients he has seen in the last 5 months, 12 showed no reluctance about admitting the nature of the abortion and in the other 3 cases a criminal origin could not be satisfactorily excluded.

Wiegels states that many physicians will interrupt a pregnancy because the family is poor and has many children; a physician who does this ceases to be a physician and becomes a social worker. He condemns the Neo-Malthusian teaching. An indication for abortion is either medical or social; if it is solely social it is not to be recognized.

As for eugenic indications, he states: "Our knowledge of the whole subject of hereditary transmission stands upon such weak legs that we are not justified in deciding upon an abortion on the ground of our so far accumulated experience. Only in very rare cases could a psychiatric specialist decide on an abortion."

Wiegels regards the Mendelian nature of human attributes as not yet sufficiently established to form a basis for interference with pregnancy except possibly in rare cases as for example in which the family tree is laden with epilepsy and idiocy. Likewise sterilization is very rarely indicated. The eugenic indication is not recognized by the leading gynecologists, psychiatrists, and clinicians.

Like Benthin, Wiegels notes that the Russian invasion of East Prussia resulted in the impregnation of many German girls by the Russian hordes, and he endorses Döderlein's standpoint, "The interruption of a pregnancy in case of a definitely proved rape is not punishable"; but he raises the point that it is difficult to prove the lack of consent.

RAMSAY SPILLMAN.

Horvat, A.: *Statistics on Criminal Abortion*. Monatsschrift für Geburtshilfe und Gynäkologie, 1922, lix, 278.

Of the 122 abortions investigated as to cause of abortion, 62 or 50.8 per cent were definitely criminal and 19 more almost certainly criminal. The incidence of criminality, therefore, was 66.4 per cent. Of these patients, 29 had a normal or subnormal temperature and many patients who had fever on admission had normal temperatures after a short rest in bed. Hence the presence of fever in abortions should not be used as criticism of criminality.

The number of married and unmarried women was practically the same. Most of the abortions occurred in patients between the ages of 25 and 30 but most of the criminal abortions took place between the 18th and 24th years.

Among the 81 cases of criminal abortions, seven died (8.6%). The actual mortality of criminally induced abortions however is much greater than here indicated for only a small number of the patients are brought to hospitals. The most common method used to induce abortion was the injection of soap and water into the uterus by means of a syringe.

J. P. GREENHILL.

Marx: The Differential Diagnosis between Abortion, Pregnancy and Disease. *Zeitschrift für Geburtshilfe und Gynäkologie*, 1922, lxxxiv, 742.

The author describes a case of fatal sepsis following an abortion induced by catheter at the third or fourth month. The infecting organisms were gram positive cocci and rods. The gram positive rods had led to gas formation within the uterus, with the development of cavities in the uterine wall, which showed a number of small points of rupture at the uterine fundus. Difficulty in establishing a clinical and even a pathological diagnosis of abortion was very great and was increased by the fact that the patient gave a false history. Pelvic examination suggested an interrupted pregnancy, as did the unopened uterus at the autopsy, while a gross section of the hardened specimen resembled a destructive neoplasm. It was only on microscopic examination that a definite diagnosis was possible. The case was further obscured by the demonstration of methemoglobin in the bloody exudate in the culdesac of Douglas and also in the blood tinged urine. This at first directed attention to the possibility of poisoning by some blood destroying drug, but it was finally decided that the change was due to bacterial activity.

MARGARET SCHULZE.

Campbell, John: The Position of the Medical Practitioner Called in to Attend a Case of Procured Abortion. *The British Medical Journal*, Dec. 10, 1921, No. 3180, p. 985.

The author considers three factors as influencing the physician in meeting his obligations to the patient and the community. (1) A doctor may be aware of the intention to commit crime before the operation is performed. In this instance the doctor can do nothing except in a psychological way. (2) After the crime has been committed but without fatal result to the woman, the physician is called in to treat complications. Under these conditions he is bound to professional secrecy. (3) When the crime has been committed and a fatal outcome has resulted the coroner should be notified of the circumstances under which the woman died.

F. L. ADAIR.

Nijhoff: Fetal Death Due to Intrauterine Strangulation. *Nederlandsch Tijdschrift voor Geneeskunde*, 1923, i, 142.

One of the less frequent causes of death of the fetus in utero is strangulation due to tight winding of the cord around the neck. Nijhoff has observed three cases in which he feels this was the case. In each instance the mother was delivered of a macerated fetus. He believes that the fetus dies as a result of interference with the circulation of the cord itself.

R. E. WOBUS.

Seggelke: Quinin as an Oxytocic in the Treatment of Abortion. *Therapeutische Halbmonatshefte*, 1921, xxv, 17.

The author recommends quinin as a stimulant to uterine contractions in cases of abortion. He uses 0.5 gm. intravenously in 10 c.c. of sterile distilled water, and simultaneously a similar dose intramuscularly. Moderate toxic symptoms usually appear but may be minimized by slow injection and have never been followed by serious after effects. Strong pains usually follow the injection shortly and bring about cervix dilatation and the expulsion of the fetus. Separation of the placenta does not seem to be favored and the method has not been successful in causing its expulsion in cases of incomplete abortion. The cervical dilatation procured, however, is of distinct advantage when operative interference becomes necessary, and obviates the necessity of forcible dilatation with its resultant tears and portals

of entry for infection. The procedure is of particular value in limiting the necessity for operative intervention in infected cases.

MARGARET SCHULZE.

Joseph: Treatment of Abortion. *Therapie der Gegenwart*, 1921, lxii, 299.

The therapy of threatened abortion is very simple: no instruments, one examination, strict rest in bed, and perhaps some opium; this regime often arrests considerable hemorrhage and saves the pregnancy. In some cases a patient has to keep her bed throughout pregnancy because of bleeding, and still bears a living child.

In operative treatment of abortion one must differentiate sharply between the aseptic and the febrile cases. In the aseptic, immediate intervention is indicated only when there is severe hemorrhage. Joseph condemns the time-honored tamponade for dilatation and induction of pains because it is practically worthless and also produces favorable circumstances for the spread of bacteria from the unsterilizable vagina. It is allowable only for checking hemorrhage until the patient can be taken to the hospital.

In cases of severe hemorrhage Joseph dilates the cervix cautiously. He detaches the placenta with his finger, pressing on the uterus from without with the other hand, at the same time orienting himself as to the uterus and its contents. He then eures with a large sharp curette until the curette is heard to grate on the muscle. The fetus may be removed piecemeal if necessary, with ovum forceps; but the ovum forceps for detaching the placenta, together with the small curette, Joseph condemns.

Febrile cases: regardless of the results of blood cultures or of whether the infection has extended beyond the uterus or not, Joseph regards the septic ovum as a feeder of infection, and as such, to be evacuated with a minimum of trauma. If the cervix is undilated, a hollow laminaria pencil or the Hegar dilators are used. The author warns against enrettement either after or without manual evacuation of the uterine contents because the curette opens the blood- and lymph-vessels and forces bacteria into them. A hot alcohol douche is used to promote contraction after the uterus is emptied.

By the active method 450 abortions have been treated in the Moabit Hospital, of which one septic patient died; a second case, also lost, had been curetted before admission and was on admission markedly septic.

RAMSAY SPILLMAN.

Kouwer: The Treatment of Abortion. *Nederlandsch Tijdschrift voor Gyneceskunde*, 1923, i, 970.

In the treatment of abortion not only the immediate, but also the later results must be taken into consideration. Not only the future health of the woman, but the question of future pregnancies must be borne in mind.

Kouwer discusses a series of 1938 abortions. Among these were 20 deaths. It is noteworthy that only one death occurred on account of anemia, and he speculates whether this, possibly, might not have been avoided by blood transfusion. Excepting one case of bichloride poisoning, all other deaths were due to some form of sepsis. Next to peritonitis, embolic infections of the lung occurred most often.

The choice of treatment is open to discussion and Kouwer himself has at times been uncertain which is the better, active or expectant. He thinks a distinction should be made between treatment in the home and in a hospital. He usually cleanses vulva and vagina, catheterizes the bladder, and inserts two ungloved fingers

into the vagina for the purpose of exploration. If the cervix easily admits the finger, the middle finger is used to clean out the uterine cavity, the left hand pressing the uterus against the finger. Thus time, blood and money are saved. In some cases however, he finds a short chloroform narcosis necessary. In case the dilatation is insufficient, treatment is either delayed or the cervix is packed.

In the presence of fever, the mode of procedure is the same, provided that extra-uterine infection can be excluded with reasonable certainty. In any event, Kouwer insists on sufficiently prolonged bedrest after the subsidence of the fever or the cessation of bleeding.

While in the past he has used the curette, Kouwer rather deprecates its use. He also advises most emphatically against the use of the placental forceps, especially in untrained hands. The injury caused by the curette gives rise to the formation of scar tissue and occasionally is directly responsible for subsequent sterility. One of the advantages of digital evacuation is the fact that a woman can be safely treated by the general practitioner in her own home.

R. E. WOBUS.

Engelman, F.: Abortion and its Treatment. *Medizinische Klinik*, 1922, xviii, 493.

Within recent times the number of abortions has multiplied fivefold, due doubtless to the marked increase in the number of criminal abortions. The large majority of febrile abortions are criminal. There has also been a frightful increase in the mortality from abortions since the war. Shall the treatment be active or expectant, and how shall active treatment be conducted? The author believes that the division into febrile and afebrile abortions is useful, but further divides the febrile group into those in which the infection is limited to the uterus and those in which the infection has spread beyond the uterus. These are called simple and complicated cases respectively. During the last 2½ years among 1689 abortions, 554 were febrile. The general mortality was 1.3 per cent; but for the simple abortions it was ½.1 per cent, while for the complicated cases it was 4½-6½ per cent. The plan of treatment outlined by the author is as follows: In every case where the bleeding is not severe or where the ovum is not in the cervix and easily removable, the patient is put to bed for a day to determine the type of abortion. If no fever occurs or no complications are found, the uterus is emptied. The same treatment applies to patients with mild fever without complications. If high fever or fever with complications are found, an expectant policy is pursued. If the temperature subsides and the complications disappear, the uterus is emptied. If the patient does not improve under the expectant treatment, it is best to invade the uterus to prevent a general infection.

The author believes that in the first few months, the finger is more dangerous than the curet in the treatment of febrile abortions. He uses a broad sharp curet for afebrile cases, a broad dull one for febrile cases and in advanced cases an ovum forceps in addition to a curet.

J. P. GREENHILL.

Offermann: The Treatment of Febrile Abortion and Remarks Concerning Criminal Abortion in General. *Zeitschrift für Geburtshilfe und Gynäkologie*, 1921, lxxxiv, 356.

The author presents conclusions from a careful study of the recent literature and the observation of 74 cases of febrile abortion treated in the Königsberg Clinic. He believes that the immediately active therapy of febrile abortion is more dangerous than the conservative or than the conservative followed by active intervention after the disappearance of streptococci and fever. The danger is expressed in the frequency and the severity of the complications. Active treatment is particularly

to be avoided in cases of criminal febrile abortion. Cases showing streptococci run a particularly severe course; conservative therapy is strongly to be recommended in them. The duration of fever is no longer with conservative than with active treatment. A more prompt defervescence follows completion of the abortion with the conservative treatment. The passage of the placenta is of less importance in defervescence than of the embryo. Completion of the abortion is followed by prompt defervescence in about half the cases. Repeated chills are not a factor in the type of treatment to be selected.

MARGARET SCHULZE.

Liepmann and Wels: Perforation of the Uterus in the Treatment of Abortion. Medizinische Klinik, 1922, xviii, 1291.

Since 1907 there have been reported 266 cases of perforation of the uterus following operation for abortion. The mortality was 31.2 per cent. The responsible instrument was mentioned in 153 instances: ovum forceps in 47, curette in 42, Hegar dilators in 27, catheter in 20, uterine sound in 13, and finger in 4 cases. This indicates that the finger is the least harmful means of emptying the uterus and that slow dilatation with laminaria is preferable to forcible dilatation. In 17 cases the omentum was drawn down, in 55 cases the small intestine and in 25 cases the large intestine. In one patient, as much as 5½ meters of intestine were pulled down through the rent in the uterus. It is important for the physician to realize that the perforated uterus should not be explored too much with the examining finger as it will force decidua and bacteria into the peritoneal cavity and thereby hasten death. To save the patient, laparotomy with total extirpation is usually necessary. Perforation without infection is rare.

J. P. GREENHILL.

Van Dongen: My Cases of Abortion. Nederlandsch Tijdschrift voor Geneeskunde, 1922, ii, 2033 and 2346; 1923, i, 24.

In this series of 1193 cases which van Dongen personally curetted, were 1081 clinic patients and 112 private patients. There was no death in the private cases and only 16 deaths among the clinic cases. This makes a total death rate of 1.4 per cent.

All cases which, on admission, showed an axillary temperature of 38° or over were classed as febrile. Thus, there were 897 afebrile and 296 febrile cases, a percentage of 24.8, which corresponds rather closely with the statistics of other observers. Twelve deaths were among the febrile cases, the four deaths among the afebrile cases were attributed to the following causes: one each due to bichloride poisoning, to hemorrhage, to influenza pneumonia and to thrombophlebitis with pulmonary embolism. This makes a corrected death rate of 0.4 per cent in the afebrile cases. None of the afebrile cases developed peritonitis, sepsis or periuterine complications later.

With these results, van Dongen was not easily persuaded to try conservative treatment. However, he did finally apply it in 30 cases, but when he found that most of these had to be curetted afterwards, he abandoned it. He does not, however, except in case of severe bleeding, curette cases complicated by peritonitis, sepsis or adnexal infection, laying great stress on accurate diagnosis before instituting any form of treatment.

For severe hemorrhage, he curetted 5 complicated afebrile cases with no death and 22 febrile cases with a mortality of 9 per cent. Most of these were curetted in the hope of saving desperate cases.

Among the afebrile cases, none died of sepsis. Of the febrile cases, 80 per

cent were afebrile within two days. The average stay in the hospital of all cases was 11.25 days.

Due to economic conditions as well as to general demoralization, he finds criminal abortions much on the increase. In these cases fever and complications were much more frequent. While usually performed within the first three months, he had them as late as the fifth and sixth month. In the series there were 5.9 times as many married women as single girls yet, for obvious reasons, criminal cases were much more frequent among the latter. While the total mortality was only 1.4 per cent, among the known criminal cases it was 7.7 per cent. He has observed that where contraceptives are sold, advice as to producing abortions, if not the actual means, may also be procured.

Van Dongen uses in all cases the polyp forceps and sharp curettes of three sizes. He believes when these are intelligently used, the minimum amount of trauma is inflicted. When necessary, he uses steel dilators. He has never perforated a uterus and insists that an awkward man may cause an injury even with his finger.

He prefers the curette because instruments are smaller in calibre. One can operate with a lesser degree of dilatation, and narcosis becomes superfluous in most cases. Manual removal is more apt to produce complications in several ways. The squeezing in bimanual manipulation is more likely to produce phlebitis and sepsis, as well as adnexal complications. A greater degree of asepsis is possible with instruments.

Whether manual removal or conservative treatment is preferable, he will not decide, but Schottmueller found his results more satisfactory, and his complications and mortality decrease, as he changed from manual removal to conservative treatment and then to instrumental removal.

R. E. WOBUS.

Bernstorff: *The Treatment of Septic Incomplete Abortion.* The Journal of the Kansas Medical Society, 1921, xxi, 327.

A study of 200 consecutive cases in Cook County Hospital between the years 1913-1919 leads the author to conclude that cases of septic incomplete abortion should have no operative interference until the temperature has been normal at least five days (except in hemorrhage that threatens life). This results in fewer days of fever, shorter stay in the hospital, less complications and lower mortality. So-called nonseptic cases should be subjected to curettement as a routine because 40 per cent of these cases on expectant treatment have to be curetted. Different phases of the cases studied are tabulated for comparison of result of operative and expectant treatment.

W. K. FOSTER.

Schottmüller: *Treatment of Infected Abortion.* Muenchener medizinische Wochenschrift, 1921, lxxviii, 662.

The author has treated 6000 cases of abortion. The first 500 cases were treated actively whether febrile or not, and the uterus emptied or cleaned out by the manual method. The mortality in this series was 3.0 per cent: of course cases presenting parametritis, salpingitis or gonorrhoea were treated conservatively.

In the next series of 1500, the cases showing haemolytic streptococcus in the uterine or cervical discharge were also treated conservatively. Total mortality for the 2000 cases was 7.4 per cent.

In 1914, curettage (large blunt curette) was substituted for digital cleaning out of the uterine cavity, in the active treatment and 3200 so treated the mortality was 0.35 per cent. In this same time 500 were conservatively treated (complete abortions, complications or infected with streptococcus haemolyticus) and

mortality here was 3.97 per cent. So in the active treatment of infected as well as noninfected abortions the mortality was reduced from 3.0 per cent to 0.35 per cent, the curettage as against digital cleaning out of the uterus being responsible for a drop in mortality from 1.5 per cent to 0.35 per cent in the series of 4700 cases actively treated.

The author ascribes this lowered mortality to (1) avoidance of narcosis, (2) avoidance of cervical dilatation, (3) lessened danger of scattering bacteria through endometrial vessels (by massage and pressure of manual method), (4) shorter and surer procedure of curettage.

While he admits that the conservative handling of infected abortion is safer than the active, he argues that the active should be taught and employed because (1) it shortens the patients illness, (2) the mortality is very low, and (3) patients conservatively treated come back eventually for curettage due to metrorrhagia and subsequent anemia.

Therefore (1) he would treat all abortions actively (except complete abortions, those with cervix not yet dilated, those with complications as parametritis, salpingitis, peritonitis, and gonorrhoea and those infected with streptococcus haemolyticus) and (2) he would substitute entirely the curettage for the digital method of cleaning out the uterus.

S. B. SOLHAUG.

Zelnik: On the Treatment of Cases of Febrile Abortion. Wiener klinische Wochenschrift, 1920, xxxiii, 580.

The author examined the uterine discharge in 43 abortions running a high temperature and found hemolytic streptococci in 6 cases, and anhemolytic streptococci, staphylococci pyogenes aureus and albus, gram positive colonies in the other cases. He could establish no relation between the bacteriological finding and the course of the disease. Of the two of the patients who died of pyemia one showed anhemolytic streptococci, the other staphylococci. Of the 6 infected with hemolytic streptococci only two had localized complications, and all survived. There is no means of prophesying the course of a septic abortion; or of differentiating between a short or one day fever and severe sepsis by bacteriological examination. Therefore the decision as to whether to use operative or inactive treatment cannot be reached by means of bacteriological studies.

In 1917, 642 incomplete abortions entered the hospital, 144 (22.4 per cent) of which had fever. Most of these had an immediate curettage to remove the retained products of conception. Of the 144 febrile cases in 113 (78.4 per cent) the temperature dropped after the operation. Of the other 31, 21 (44.5 per cent) recovered after going through severe local complications, while 10 (6.9 per cent) died of sepsis or peritonitis. All those without fever recovered. The mortality

The author believes that in the first few months, the finger is more dangerous than the curet in the treatment of febrile abortions. He uses a broad sharp curet in the total number of cases was 1.5 per cent.

In the year 1919 those cases with fever were treated expectantly until the temperature had dropped to normal and then curetted. In all, 843 cases were treated, 154 (18.2 per cent) of which had fever. In 122 (79.2 per cent) of the 154 febrile cases the temperature dropped to normal in two or three days after entrance, with treatment by rest in bed, ice bags and ergotin. Of these 122, 23 received no further treatment because the cessation of bleeding and size of the uterus showed that the contents of the uterus had come out. The other 99 were curetted and had a rise in temperature for from two to eight days after operation, and then became normal again.

Of the remaining 32 of the 154 cases with fever, 21 (13.6 per cent) recovered after a long sickness with local complications in the adnexa and parametrium, while 11 (7.1 per cent) died of sepsis, that is 1.3 per cent of all those treated in 1919.

These two series of cases contain no patients who were curetted before entrance in the hospital. The curettage was done in the 1919 series on the second or third day after the fall in temperature to normal.

A study of the figures given shows that the results were the same in both series of cases. In future the author will curette immediately those cases which have fever and no local inflammatory process in the parametrium and adnexa, and will wait on those cases that do have an inflammatory lesion.

FRANK A. PEMBERTON.

Neu: Is Hemorrhage in Abortion an Indication for Immediate Emptying of the Uterus? *Muenchener medizinische Wochenschrift*, 1920, lxxvii, 1350.

The routine in handling cases of abortion at the Frankfurt clinic involves a bacteriological examination of the uterine secretions. In general the conservative treatment is followed and the tendency is to avoid radical measures even in hemorrhage. Where streptococci are found in the uterine secretions curettage is never done, and packing of the uterus is employed in bleeding cases until the results of the bacteriological examination are known. He concludes:

(1) In the literature only two cases are reported of death resulting from hemorrhage following abortion, and one of these is scarcely authentic. (2) The morbidity and mortality of women who have sustained marked loss of blood in the radical treatment cannot be entirely attributed to the blood loss. The radical treatment in streptococci cases is by itself the greatest danger to the patient. (3) The mortality and morbidity through hemorrhage amounts to 0% in the material of the Frankfurt clinic of 1909-1920 (total of 3950 cases). (4) The hemorrhage in abortion may be stopped without any trouble by properly packing the vagina. This procedure is harmless. It enables one to guard the patient against hemorrhage until the bacteriological examination can be carried out. (5) Vaginal tamponade can be safely limited to about 15 per cent of all cases coming for treatment. The author sees no indication in the danger of hemorrhage in abortion for radical interference in streptococci cases.

S. B. SOLHAG.

Rongy and Arluck: Missed Abortion. *Surgery, Gynecology and Obstetrics*, 1921, xxxii, 171.

These authors see no reason for deferring action in case of death of the fetus, once the diagnosis is definitely made, unless the patient is near term at which time spontaneous expulsion is to be expected. In any event, the patient should be watched for signs of toxemia. They report five cases.

R. E. WOBUS.

Crawford: Pregnancy with Death of Fetus and Failure of Efforts at Spontaneous Delivery, Resulting in Macerated Fetus and Perforation of Abdominal Wall; Operative Removal; Recovery. *Surgery, Gynecology and Obstetrics*, 1921, xxxii, 269.

A woman of 26, mother of two healthy children, menstruated last in Dec. 1918. She ceased to feel life Sept. 25, 1919 and was in labor for "half a night" on Oct. 7. Two days later she passed blood and cheesy material. The latter material was passed for 3 months. In May 1920 "her abdomen opened" and two weeks later she began passing fetal bones through this opening. On July 21, 1920, she came to the hospital. The opening in the abdomen was sufficiently large so that, under narcosis, the remainder of the fetal remains could be removed. Exploration showed the cavity to be continuous with the cervical canal, a fetal femur protruding from the latter into the vagina.

R. E. WOBUS.

Book Reviews

Ephraim McDowell—"Father of Ovariectomy" and Founder of Abdominal Surgery. With an Appendix on Jane Todd Crawford.
By AUGUST SCHACHNER, M.D., F.A.C.S., Louisville, Kentucky.
Philadelphia and London, J. B. Lippincott Company. 1921.

Ephraim McDowell was no ignorant country doctor of the frontier. Although he received his preliminary education in the newly organized Transylvania University of Kentucky, and later spent several years with Dr. Alexander Humphreys of Virginia, who was a graduate of Edinburgh, McDowell, at what must have been an immense sacrifice in those days, spent the years of 1793 and 1794 studying at the University of Edinburgh. Here he came into contact with some of the best known medical men of his day including John Bell, the anatomist and surgeon, Munro, Rutherford, Gregory and others.

McDowell did not obtain his degree in Edinburgh. On his return "his influential connections, the eclat of his foreign training and the absence of any competition" soon brought him an extensive practice. He was the first surgeon to the west of the Alleghany Mountains. He performed thirty-two lithotomies without the loss of a life, and did numerous herniotomies.

In December of 1809 McDowell performed his first ovariectomy on Mrs. Crawford, successfully removing a huge ovarian cyst. He ligated the pedicle and brought out the ligature through the lower angle of the wound which was closed. The operation, performed before the days of anesthesia, required twenty-five minutes. In all McDowell performed at least eight ovariectomies with one death.

Schachner's biography contains not only what is known, from all available sources, about McDowell but also a variegated history of frontier Kentucky, of the early surgeons of the then new United States. He also, draws a picture of Edinburgh shortly after the close of the American revolution. Much controversial matter is discussed, in order to emphasize McDowell's preeminent and now almost universally accepted claim as the father of ovariectomy and the founder of abdominal surgery.

ROBERT T. FRANK.

Birth Injuries of the Child. By HUGO EHRENFEST, M.D. D. Appleton & Co., New York & London, 1922.

Dr. Ehrenfest's book on birth injuries comes from the press at a time when the public conscience is alive to the importance of proper care in pregnancy and labor. As the author quotes in his preface, the new-born seemingly often has been considered an unavoidable by-product by the obstetrician in the care of the puerperal woman, and there is so much truth in this statement that it deserves repetition. The pediatrician does not step in, as a rule, until the end of the first month of the infant's life and through this period including the labor there is a mortality of about 8 per cent. There is also considerable morbidity and on the part of the obstetrician there have been made but feeble attempts to solve the many problems that arise in connection with the etiology and treatment of these birth injuries.

Hitherto such information as is found in this monograph could be obtained only by consulting works on pediatrics, neurology and orthopedic surgery, and the gathering together of the data concerning etiology, pathology and symptomatology

of injuries occurring at parturition was a task which the author had to approach without the guidance of a similar volume. This book must be considered as an original venture, and the reviewer feels that it is one that will be repaid by the actual saving of infant lives.

The subjects are arranged in a series of sixteen chapters that carefully review the types of birth injuries according to their localization. The three of most importance are entitled "Injuries of Cranial Bones," "Intracranial Injuries," and "Brachial Birth Palsy."

The reviewer believes the book might be condensed by combining several of the chapters as, "Injuries of the Neck" with "Injuries of the Sternomastoid Muscle." Injuries to the extremities which are chiefly fractures should be considered together and also those injuries to the thorax, face, eye and abdomen that are produced by general trauma. These combinations would leave the reader free to consider in continuity of thought the more severe and common injuries.

In the treatment of head injuries the author speaks of the method of manual redressment for indentation of the skull bones as suggested by Murray and Kerr, but without proper criticism. This method of compression is very apt to do injury to the tentorium, just as compression at birth, and while the depression may be relieved by such a measure it is likely to do more harm than good. He also leaves the inference that the depressed bone with no observable symptoms of intracranial damage should be left alone, citing Goodman and Hofmeier to this effect. As regards the deep depressions, in which he states that a bone might be considered to be fractured, he believes that careful lifting would be desirable. It would seem that the same surgical principles might be made use of that apply to the head injuries in an adult.

The paragraphs of asphyxiation show the author's bias in considering the results of congestion and exudation from such a cause. It is commonly known that many infants who die of head injuries have hemorrhages in the viscera. The recent attempts at an explanation of these hemorrhages on the basis of a peculiar diathesis or congenital disease has undoubtedly very much impressed the author. However, in reviewing this subject one should remember that more than 50 per cent of these babies are premature and their vascular systems are not fully developed. Considering also the large number of red blood cells that may be present, asphyxia and slowing of the blood stream would account for the exudation. A few pathologists are already giving as a cause of death on the autopsy records "congenital hemorrhagic diseases of the new-born," while as a matter of fact, the hemorrhages have probably occurred in conjunction with intracranial injuries. Too much may be made of this particular symptom to the possible exclusion of the diagnosis of head injuries, the result of protracted labor and instrumental extraction.

The chapter on Brachial Birth Palsy is a very interesting one and the author in considering the etiology speaks of the actual trauma by the compression of the forceps blade and also the pressure on the neck in extraction of the breech by the Mauriceau-Smellie method. He definitely turns aside from the explanation of Erb's paralysis from the standpoint of epiphyseal separation or rupture of the capsule of the shoulder. In the treatment of this condition the author gives but a few brief paragraphs but he does insist that in breech deliveries the traction on the child must be on its long axis and never with the head in lateral flexion.

On the whole Dr. Ehrenfest's book is one of the most valuable that has been contributed to the literature of obstetrical subjects, and his explanation of the dangers lurking in the different types of manual and instrumental corrective measures will do much to render child-bearing safer both for the mother and the baby.

HAROLD BAILEY, M.D.

Pathologisch-anatomische Situsbilder der Bauchhöhle. Lehmann's Medizinische Atlanten Band XIV. VON DR. SIEGFRIED OBERNDORFER, a.o. Universitätsprofessor. J. F. Lehmann's Verlag, Munich.

Aberrations of the relative size and position of the abdominal organs, caused either by developmental defects or by pathological processes, are of interest both to the diagnostician and the abdominal surgeon. Over a period of 15 years, Oberndorfer has collected photographs in situ of 92 unusual conditions of the abdominal viscera which he has encountered at autopsy. These are reproduced in beautiful photogravure plates with accompanying sketches and concise descriptions of the pathological findings. He has included such conditions as developmental anomalies, changes due to inflammation and to newgrowths, hernias, thrombosis of abdominal vessels, pregnancy, etc.

To the abdominal surgeon, who must ever visualize the gross pathological anatomy which he is liable to encounter on the operating table, this volume is a most valuable aid in making a prompt diagnosis. Like the other volumes of the series, it is the kind of book one enjoys glancing through after a day's work, absorbing knowledge in this refreshing manner when one is too tired to peruse the printed page.

R. E. WOBUS.

Abdominal Pain. By PROF. DR. NORBERT ORTNER. Authorized translation by Wm. A. Brams, M.D. and Dr. Alfred P. Luger. Rebman Company, New York, 1922.

The title of this work fails to do it justice. It is really a very exhaustive, yet concise treatise on the differential diagnosis of all those conditions in which abdominal pain is one of the symptoms, usually the most apparent one. This includes retroperitoneal conditions, diseases of the spine and its contents, injuries and diseases of the testicle and certain diseases of the chest and its contents.

The author begins with a consideration of abdominal pain in general. He then takes up the differential diagnosis of conditions characterized by acute pain in the abdomen. This part is a most admirable chapter on the differential diagnosis of the so-called "acute abdomen" a subject which at times puts to a severe test the diagnostic acumen of even the most experienced surgeon. The diagnosis of conditions causing less acute or intermittent abdominal pain is discussed with equal thoroughness.

The second part of the work is devoted to the study of conditions causing more or less localized pain. Besides taking up the local lesions which may give rise to pain, such general conditions as malaria, plumbism, cardiovascular disease and acetoneuria are discussed, as well as more remote conditions as poliomyelitis, pleurisy, mediastinal disease, diseases of the oesophagus, etc.

To readers of German, this work has long been known as a classic and needs no introduction. The translators have performed a real service by making it accessible to the English reader.

R. E. WOBUS.

Books Received

SEX AND THE SENSES. By JAMES S. VAN TESLAAR, RICHARD G. BADGER, Boston.

ZUR LEHRE VON DER ZWILLINGSSCHWANGERSCHAFT, MIT HETERO-
TOPEM SITZ DIR FRÜCHTE, VON FRANZ LUDWIG VON NEUGEBAUER. BIBLIOTHEK MEDI-
ZINISCHER MONOGRAPHIEN BAND I, VERLAG VON DR. WERNER KLINKHARDT, Leipzig.

THE BIOLOGY OF TWINS (MAMMALS). By HORATIO HACKETT NEWMAN.
The University of Chicago Press, Chicago, Illinois.

THE PHYSIOLOGY OF TWINNING. By HORATIO HACKETT NEWMAN. The
University of Chicago Press, Chicago, Illinois.

THE MAMMARY APPARATUS OF THE MAMMALIA. By ERNEST BRESSLAU.
With a Preface By PROF. J. P. HILL, Methuen & Co., Ltd., London.

DIE GESCHLECHTLICHE AUFLÄRUNG IM ERZIEHUNGSWERKE. VON
PRIV.-DOZENT DR. JOSEF K. FRIEDJUNG, Verlag Von Josef Safar, Wien und Leipzig,
1922.

THE CAUSATION OF FETAL DEATH. By EARDLEY HOLLAND, M.D., F.R.C.S.,
F.R.C.P., Surgeon at the City of London Maternity Hospital, Assistant Obstetrical
Physician at the London Hospital. Published Under the Authority of His Maj-
esty's Stationery Office, London, 1922.

FEEDING DIET AND THE GENERAL CARE OF CHILDREN. A BOOK FOR
MOTHERS AND TRAINED NURSES. By ALBERT J. BELL, A.B., M.D., Assistant Professor
of Pediatrics in the Medical Department of the University of Cincinnati, Attend-
ing Pediatrician to the Cincinnati General Hospital, The Tuberculosis Hospital and
the Christ Hospital, Member of the Medical Milk Commission and Chairman of
the Divisional Council on Child Hygiene Cincinnati, etc. Illustrated. F. A. Davis
Company, Publishers, Philadelphia, 1923.

OBSTETRIC TABLES. A GUIDE FOR STUDENTS. By MAURICE C. ANDERSON,
L.R.C.P., Ed., Obstetrician, Brixton Hill Maternity Home, Gynecologist Brixton
Dispensary, etc. Second Edition, A. & E. Black, Ltd., London, W. I., 1923.

HYGIENE OF WOMEN AND CHILDREN. By JANET E. LANE-CLAYTON, M.D.,
D.Sc., (London); Dean and Lecturer on Hygiene in the Household and Social
Science Department King's College For Women, Justice of the Peace, Formerly
Medical Inspector Under the Local Government Board, Henry Frowde and Hodder
& Stoughton, London.

THE TREATMENT OF COMMON FEMALE AILMENTS. By FREDERICK
JOHN McMANN, M.D., Edin; M.R.C.P., London; F.R.C.S., England; Surgeon to In-
Patients Samaritan Free Hospital For Women, London, etc., Edward Arnold & Co.,
London, 1922.

PRACTICAL MIDWIFERY. By GIBBON FITZGIBBON, M.D., B.Ch., B.A.O. (Dub. Univ. F.R.C.P.L., L.M., Master Rotunda Hospital Dublin. With 175 Illustrations, J. & A. Churchill, London, 1923.

THE PATHOLOGICAL PHYSIOLOGY OF SURGICAL DISEASES. A BASIS FOR DIAGNOSIS AND TREATMENT OF SURGICAL AFFECTIONS. By PROFESSOR DR. FRANZ ROST, University of Heidelberg. Authorized Translation By Stanley P. Reimann, M.D. With a Foreword By John B. Deaver, M.D., LL.D., ScD., F.A.C.S. P. Blakiston's Son & Co., Philadelphia, 1923.

CLINICAL AND OPERATIVE GYNAECOLOGY. By J. M. MUNRO KERR, Professor of Obstetrics and Gynaecology, Glasgow University (Muirhead Chair), Gynaecological Surgeon Royal Infirmary, Glasgow, Honorary Fellow American Gynaecological Society, etc. Henry Frowde and Hodder & Stoughton, London, 1922.

PHYSIOLOGIE UND PATHOLOGIE DER HYPOPHYSE. VON PROFESSOR DR. ARTHUR BIEDL, mit 42 Abbildungen im Text. München und Wiesbaden. Verlag von J. F. Bergmann, 1922.

PITUITARY EXTRACTS. REPORTS ON BIOLOGICAL STANDARDS. By J. H. BURN, M.A., M.B., AND H. H. DALE, M.D., F.R.S. Published by His Majesty's Stationary Office. London. 1922.

KEIMESFÜRSORGE. ENTSTEHUNG UND VERHÜTUNG DER SCHWANGERSCHAFTS-STÖRUNGEN. VON PROFESSOR DR. ALFRED GREIL. Verlag von Curt Kabitzsch, Leipzig, 1923.

TRAITÉ DE GYNÉCOLOGIE MÉDICO-CHIRURGICALE. PAR S. L. FAURE et ARMAND SIREDEY. Troisième Edition, revue, corrigée et augmentée. Avec 637 figures, dont 288 en couleurs dans le texte. Paris, Librairie Octave Doin, 1923.

ANAESTHETICS IN PRACTICE AND THEORY. A TEXT-BOOK FOR PRACTITIONERS AND STUDENTS. By J. BLUMFIELD, O.B.E., M.D. Senior Anaesthetist to St. George's Hospital and Lecturer on Anaesthetics to the Medical School. Chicago Medical Book Co., Chicago, Ill., 1923.

PHYSIOTHERAPY, A MANUAL OF APPLIED PHYSICS. By C. M. SAMPSON, M.D. St. Louis, C. V. Mosby Company, 1923.

DIE GESCHLECHTSKÄLTE DER FRAU. EINE PSYCHOPATHOLOGIE DES WEIBLICHEN LIEBESLEBENS. VON DR. WILHELM STEKEL, Nervenarzt in Wien. Zweite verbesserte und vermehrte Auflage. Berlin und Wien, Urban und Schwarzenberg. 1921.

GEBURTSHILFLICH-GYNÄKOLOGISCHE PROPAEDEUTIK. VON PROFESSOR DR. OSCAR POLANO. Dritte und Vierte vermehrte und verbesserte Auflage. Mit 96 meist farbigen Abbildungen. Leipzig, Verlag von Curt Kabitzsch, 1922.

PSYCHOLOGIE DER FRAU. VERSUCH EINER SYNTHETISCHEN SEXUALPSYCHOLOGISCHEN ENTWICKLUNGSLEHRE. VON W. LIEPMANN. Mit zwei Tafeln und 10 Textabbildungen. Berlin und Wien, Verlag von Urban und Schwarzenberg. 1922.

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Original Communications

FURTHER STUDIES IN AUTOTRANSPLANTATION OF ENDO- METRIAL TISSUE IN THE RABBIT*

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IN an investigation of the hypothesis brought forward by Sampson¹ in explanation of the origin and life history of ovarian hematomas of Müllerian type, experiments were devised in which it was attempted to reproduce in a laboratory animal some of the conditions which were thought to exist in women having this interesting clinical and pathological entity.² Adult rabbits were subjected to autotransplantation into the pelvic cavity, mesosalpingeal fat and ovary, of scrapings and very finely cut pieces of cornual endometrium. After 70 days it was found that this tissue had grown where placed and, what is more important, had also developed by implantation upon the peritoneum of the cornua, cervix and mesosalpinges. These ectopic growths were in the gross and histologically much like adenomata, particularly of the multicystic type such as are met with so frequently in the ovary in women. Even a simple incision through the wall of a pregnant segment was sufficient to liberate enough epithelial cells to produce implantation "adenomas." The evidence obtained from these procedures, so far as it went, was entirely in favor of the rationality of Sampson's ideas. If menstruation had occurred in an implant and following this rupture, further dissemination of epithelial "seed" would have resulted with the chances being good for further implantation. This would complete a striking likeness to the human disease.

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NOTE: The Editor accepts no responsibility for the views and statements of authors as published in their "Original Communications."



Fig. 1.—Drawing of the posterior aspect of the uterus and its appendages of a rabbit which 150 days previously had been subjected to autotransplantation of cornual mucosa. The animal was in heat when killed. At *a* and *b* are characteristic multicystic growths attached to and invading the fat of the broad ligament. The growth at *a* arose probably by direct transplantation, that at *b* by implantation.



Fig. 2.—Drawing of the posterior aspect of the uterus and its appendages of a rabbit which had been treated as had the animal portrayed in Fig. 1. At *a* is a submerged cyst of endometrial type, at *b* and *c* are cysts resulting from endometrial implants. At *d* is a group of small cysts on the anterior surface of the mesosalpinx.

True menstruation is observed in the rabbit but the bleeding which follows the stage of congestion is very slight. This observation, how-

ever, was made on a very small number of animals and may not be entirely correct. At any rate when kept in solitary confinement the rabbit comes in heat at long and irregular intervals during the winter months. The first series of experiments was conducted over a period of 70 days, which proved to be too short a time for the animals to show oestrus or else what is more likely such periods had come and gone. In order to allow more time for oestrus to develop and to confirm the findings in the first series already reported, using the same method five nonpregnant female rabbits seven to nine months old, were subjected to autotransplantation of very minute pieces of endometrium into the mesosalpinges and free into the pelvic cavity. After 150 days these animals



Fig. 3.—Photomicrograph, x20, of the left cornu of the rabbit in Fig. 1, through the cysts at *b*. Actual invasion of the cornu has not occurred. The contents of the large cysts A, B, C, and D, was a thin yellowish fluid, and slight recent hemorrhage had occurred along the inner surfaces.

were killed. In all of them cystic growths had occurred in various parts of the pelvis (See Figs. 1 and 2, for their gross appearance and location). The distribution of these implants was essentially that observed in the human in the case of a ruptured menstruating cyst of the ovary or of primary implantation arising from endometrial cells discharged through the Fallopian tubes. While the fat of the mesosalpinges was traumatized in several places, endometrial cells placed at these sites stayed "put" very seldom and many were found to have taken hold and invaded tissue several centimeters away, at points which may or may not have suffered peritoneal injury at the time of operation. The sites

of election for the growth of these wandering groups of cells were in the mesosalpinx and mesometrium. In a series of 15 animals the abdominal wall and mesentery were never involved. In one rabbit the omentum was adherent to a loop of small intestine which lay in the pelvis and in the adhesion an endometrial cyst was found. The pelvis then is the zone of location of normal endometrial cells set free in the abdominal cavity. This is true in all the animals used in these experiments as it is also in women with few exceptions.

The treatment of this syndrome of Sampson's is operative, but com-

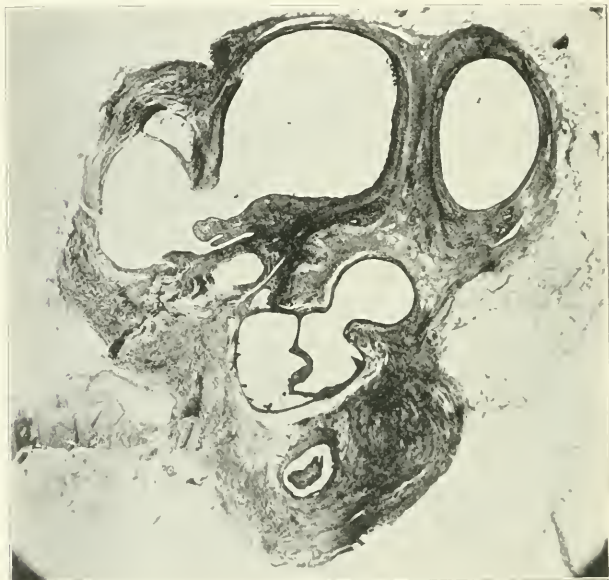


Fig. 4.—Photomicrograph of a section through the group of cysts at *d* in Fig. 2. Around some of the cysts considerable smooth muscle has grown. Hyperemia and oestral hemorrhage has occurred in the stroma beneath the epithelial lining of several cysts.

plete oöphorectomy is done only when the implants are widespread or are giving severe local symptoms, such as intestinal obstruction from an "adenoma" of Müllerian type invading the pelvic colon. These ectopic "adenomata" are apparently under the influence of an ovarian secretion to the same extent as is mucosa of the uterus and Fallopian tubes. Castration results in great atrophy of the uterine and salpingeal mucosae, and implants from them undergo a similar regressive metamorphosis (Sampson). What their ultimate fate may be is not known

for the reason that the condition has been understood and recognized only a few years.

To study further this ovary-endometrium relation complete oöphorectomy was performed upon five nonpregnant rabbits about eight months old, and at the same operation transplantation into the abdominal cavity of endometrial tissue was done, after the method described above. In all of these animals growths were obtained and in the same locations as in the uncastrated animals. A marked difference, however, was in the size. In the castrated the cysts were about one-fourth as large and with much thinner walls. The lining epithelium was flattened and with little cytoplasm, the stroma very scant and fibrous. The fact that the presence of ovarian tissue is not necessary for a certain degree of de-

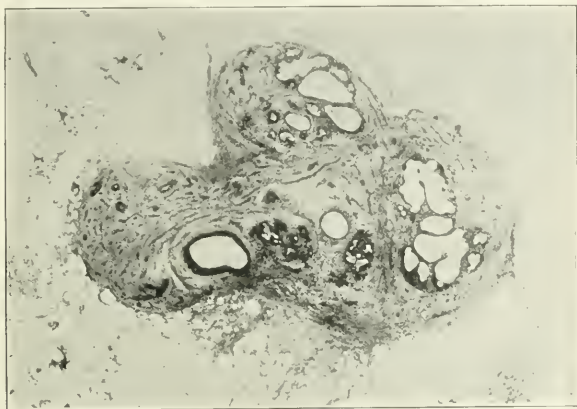


Fig. 5.—Photomicrograph of a section through the cystic growth at *a* in Fig. 1. Practically no smooth muscle is present, the reaction about the "adenoma" being more in the nature of very fibrous granulation tissue. Some blood is present in many of the cystic spaces.

velopment of this transplanted endometrium is of interest although really not surprising. The requisite ovarian hormone may have circulated in the blood for a period of time of longer or shorter duration following the extirpation of the ovaries and during this period implantation occurred.

That there is a certain danger in ectopia of tissue is well recognized by students of cancer research and in an animal harboring such growths as those just described, or in a woman who has had her ovaries removed for a ruptured menstruating cyst of the ovary with implantations, a higher cancer "potential" may with reason, be expected when the cancer age is reached.

In all of these experiments great care was exercised in order to trans-

plant mucosa alone. In some instances smooth muscle cells were included, and when mucosa and smooth muscle were transplanted together a structure suggesting another cornu was formed in miniature. Mucosa alone produced cysts, usually multilocular, and lined by ciliated columnar or cuboidal epithelium. Papillary ingrowths were frequent. The stroma was much like that of the endometrium except when the walls were so thin as to compress the stroma into a very thin layer or when there was much interstitial edema. Again is emphasized the gross and histological resemblance of many of the cystic structures produced in these rabbits, to the multilocular cystadenoma of the ovary in women—the great difference being, of course, that of size.

In two rabbits 150 days after the operative transplantation the cornua were swollen and congested. In several of the cysts found attached to and present in the mesosalpinx of these animals the blood vessels of the stroma were dilated and a small amount of fresh blood and some hemosiderin were found in the lumen along the wall. No cyst was filled with blood, however, and while this recent blood within the cysts was undoubtedly an oestral phenomenon, a real "hemorrhagic cyst" has still to be produced in the rabbit.

SUMMARY

Fifteen nonpregnant rabbits, seven to nine months old, were subjected to autotransplantation of scrapings and very minute pieces of endometrium within the abdominal cavity and the mesosalpinx. After 150 days it was found that (1) normal endometrial tissue free in the abdominal cavity attaches itself usually to the mesosalpinx or mesometrium, not to the abdominal wall or mesentery, and in only one animal was the omentum involved. This distribution is that of most cases of implantation resulting either from a primary dispersion through the Fallopian tube, or secondarily from a perforated hemorrhagic (menstruating) cyst of the ovary; (2) there are usually produced multilocular cysts which, except for their small size, are similar in many ways to the "ovarian" cyst adenoma of women; (3) extirpation of the ovaries at the time of transplantation does not prevent growth of the transplants, but the cysts formed are much smaller and thinner walled; (4) in two rabbits which were in heat at the termination of the experiment, the cornua were swollen and congested, and in a few of the cysts oestral hemorrhage had occurred in small amount but not sufficient to constitute a "hemorrhagic" cyst of the type so common in the ovaries of women.

REFERENCES

- (1) *Sampson, John A.*: Archives of Surgery, 1921, iii, 245-323. Amer. Jour. Obst., and Gynec., 1922, iv, 5. (2) *Jacobson, Victor C.*: Archives of Surgery, 1922, v, 281-300.

ACID BASE EQUILIBRIUM IN PREGNANCY AND THE NEW-BORN

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PREGNANCIES, normal apparently, are constantly presenting new questions in study in chemistry and physiology. Metabolism, at this time is rather difficult to measure accurately because of the discomforts and stress of determination, hence comparatively little has been achieved in this particular branch, while in blood chemistry much has been accomplished. Studies in the nutrition of the fetus, and the manner of gaseous exchange through the placenta are constantly accumulating because of the relative ease with which the blood samples may be collected.

The question, as to whether there is any variation in the acid base equilibrium during the period of gestation, labor, and puerperium in the mother, and as to whether there is any relationship between maternal equilibrium and the newborn fetus particularly interested us and this paper is the result of the observation of a definite number of patients from the time of their entry to the clinic until their discharge.

Some time ago Ewing reviewed the question of acidosis. Then the term usually referred to an increased amount of acetone bodies in the urine and blood, together with an increased excretion of ammonia. Since then, the work of Haldane, Sellard, Henderson, Haggard, Van Slyke and others, has demonstrated that there is a deeper significance to the so-called ketosis, particularly, that the body is robbed of its bases. We now think of acidosis, or acidemia, as that condition where there is an acid retention sufficient to lower the bicarbonate or the hydrogen-ion concentration (P_H) of the blood below the normal levels. Van Slyke's apparatus for measuring CO_2 combining power has made it easy and practicable to measure the alkaline reserve of the body. The P_H of the blood may be considered as the indicator and when it is normal the acid base is normal or compensated, but if disturbed, the life of the individual may be endangered.

The average hydrogen-ion concentration of blood is at the slightly alkaline point, that is, where P_H equals 7.4. This figure was estimated by L. J. Henderson¹ and since then has been confirmed by numerous other investigators.² Researches in the P_H of body fluids other than the blood would apparently point to the fact that they all have a hydron concentration and bicarbonate concentration relative to that of blood

plasma.² The finely adjusted action of the blood and body fluids buffer is sufficient to keep the variations in any individual within marvelously narrow limits, so that by reason of changes of an almost instantaneous character, life is continued along a practically level plane.

METHODS

For this series, women who were as near normal as possible were selected. No cases with outstanding disturbances were included, for example, those with severe vomiting or those with any suspected toxic disturbance. All patients were on an ordinary diet with no reservations, fluids were urged up to at least 40 ounces daily and the usual exercise was advised. The blood for determination was taken approximately three hours after lunch. The arm was constricted with the tourniquet just enough to cause the vein to become prominent and the pressure was released while the blood was being collected. The blood was taken directly under oil into bottles containing lithium oxalate. They were maintained under oil during centrifuging and until placed in a separatory funnel to be saturated with alveolar air. The CO_2 percentage combining power was read after the manner and technique recommended by Van Slyke. In the case of infants, the blood was taken directly from the cord, the needle being inserted in a cord vessel as soon as sufficient cord was born to tap it, in some cases before the infant was actually born. Two samples were taken, one before the infant had breathed, the other, after the child had breathed well and cried vigorously. This blood, as previously stated was also taken under oil and kept under oil throughout the whole manipulation until the CO_2 reading was made. It is a well known fact⁴ that the carbon dioxide capacity of venous blood plasma is consistently higher than arterial plasma by one-tenth. The fact that this has been shown makes the venous readings in pregnant women all the more striking in that they constantly tend toward acidosis figures. By carefully guarding the samples under oil error was eliminated as much possible, and the results recorded should be a fairly accurate indication of alkaline reserve since the readings were taken under conditions where the respiratory and circulatory systems were little disturbed and were reacting in a normal manner to normal stimuli.

The chart (Fig. 1) shows in a graphic way the fact of a definite drop in CO_2 plasma combining power and at the same time raises the question as to the cause. None of the patients at any time had any particular complaint and for the most part they were actually exercising less than previously, their activity decreasing definitely as they approached term. Urinary findings and blood pressure were undisturbed and in no case was the hemoglobin figure definitely raised or lowered.

None complained of respiratory difficulty and as far as we could detect there was no increase or deepening of respiration.

The chart (Fig. 2) is striking for the marked variation of combining power of plasma CO_2 during labor. There is an evident drop according

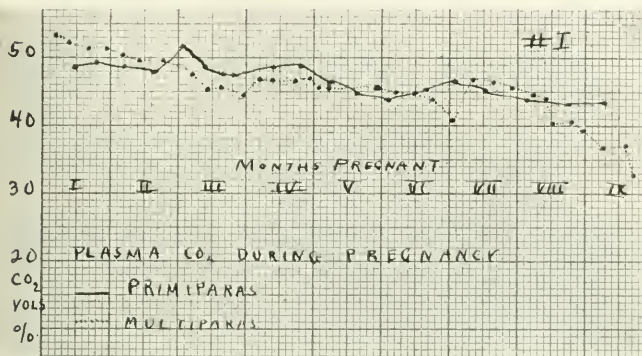


Fig. 1.—This chart shows a drop in CO_2 plasma combining power in normal pregnant women.

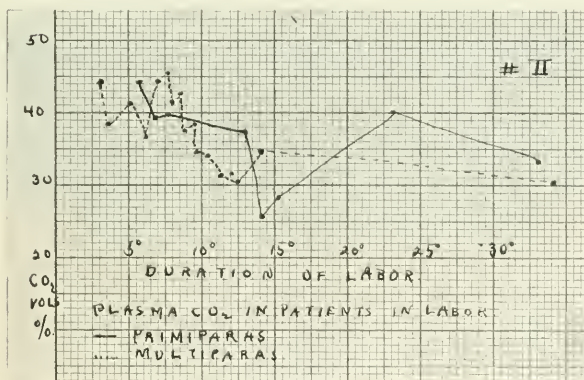


Fig. 2.—This chart shows variations of plasma CO_2 during labor.

to the time of the duration of labor and although it has not been definitely pointed out in this curve, the cases having 35 vols. CO_2 or less were distinctly those having the more severe pain, and also the pains were recurring at more frequent intervals over a longer period of time than in the case of those with the higher plasma combining power.

Practically all patients had an anesthetic, although for the most part it merely amounted to an analgesia, the patient rarely being completely unconscious except when the head was being born. Some of the patients had nitrous oxide oxygen and some others had ether only. The amount of anesthetic in all cases was small and the time of anesthesia short.

Fig. 3 carries the patients through from the standpoint of the average at each trimester of gestation and also at approximately ten days postpartum. The tenth day postpartum was selected because there was a variation and most patients would not return to the so-called normal figure before that day, although an occasional patient would. None of these patients had excessive hemorrhage and the hemoglobin readings were similar to those in any parturient woman, run-

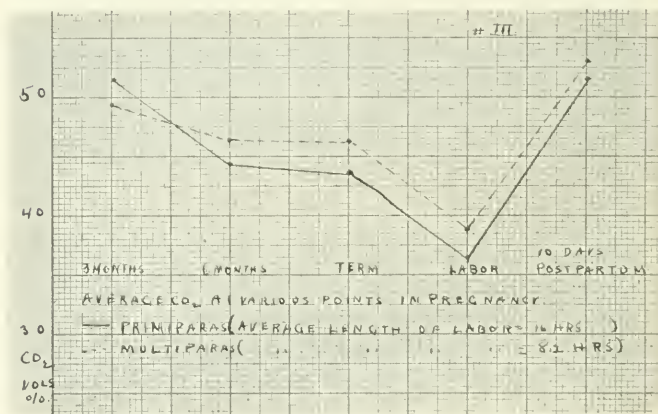


Fig. 3.—This chart shows changes occurring in pregnancy, labor and first few days postpartum.

ning from 60 to 75 per cent with an occasional patient slightly lower than the 60 per cent level.

The question of comparison of infant blood with maternal quite naturally arose and the results as above tabulated are instructive. I waited until the infants were breathing well and then withdrew the cord blood by puncture of a vessel, in each case using an umbilical vein. This vessel of course is the vessel supposedly carrying a purified blood, loaded with maternal nutriment, to the infant and it is more of an arterial nature than the umbilical artery, hence we would expect its contents, especially the gaseous ones, very nearly the same as the maternal. The fact apparently is that there is a marked and constant variation and the discrepancy is interesting as far as the CO₂ combin-

ing power is concerned, because it has been known for years³ that oxygen and carbon dioxide pass readily from mother to the child. And yet here is a definite difference in the readings of two gases which are known to diffuse readily through a membrane by osmosis. In 1901⁶ it was demonstrated by a comparison of freezing points that both maternal and fetal blood possess the same osmotic pressure, since their freezing points are the same, and therefore that osmosis should occur equally readily in either direction. The fact previously noted that the umbilical vein is richer in oxygen than the artery helps to make

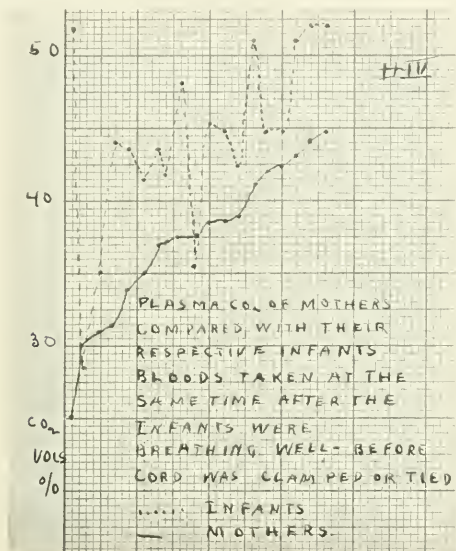


Fig. 4.—Chart showing curves of combining power of plasma CO₂ both of mother and infant.

the difference in the plasma combining power still more striking. The cases in the graph are charted opposite each other, each infant with its respective mother. Two of the infants showed a drop and were beneath their mothers' combining power and we have no explanation to offer. The conditions of delivery and removal of blood samples were as near similar to the others as it was possible to make it. I noticed too in the various samples, that the serum of the infants before breathing was consistently a bright red in color and after they had breathed and were well aerated the serum became the usual straw color. The

question as to whether it might or might not be due to hemolysis, caused by agitation in the oxalate, after the sample had been taken, or whether it was due to asphyxia, arose. The tubes were then gently rotated in identical fashion but the same phenomenon was noted. The spectroscope showed, in the samples previous to breathing, a marked amount of uncombined hemoglobin which was absent after respiration was well established. A few patients were carried under nitrous oxide to the point of being quite cyanotic and blood taken at this time showed a similar reaction in the maternal blood so the color difference is due probably to partial asphyxia. I also noted that if the blood was allowed

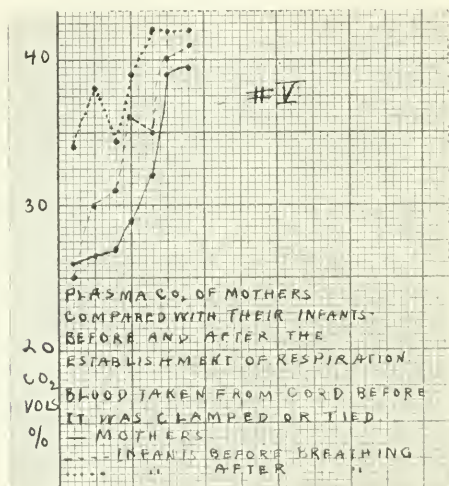


Fig. 5.—Comparison of mother's and infant's blood before and after the establishment of respiration.

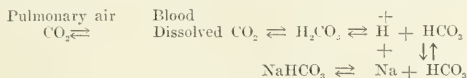
to stand, the corpuscles in the infant sample came down and separated from the plasma much more readily than did the maternal corpuscles in the same ease.

Having noted a discrepancy at the outset between the fetal and maternal blood streams, the suggestion might be made that the difference was due to the fact that the child was not yet breathing well and was partially asphyxiated during the time of delivery. Chart 5 demonstrates that there is a constant difference between the two bloods both before respiration is established and after the child is breathing and crying vigorously.

DISCUSSION

The graphs presented are of interest because they show a definite and characteristic drop in the plasma combining power as gestation goes on to completion and labor, in several cases the figures fall within the dangerous or fatal limits. The normal carbon dioxide combining power varies according to investigators⁷ between the limits of 50 and 63 volumes per cent and it is an accepted fact that the venous combining power is about 7 per cent higher than the arterial. Cannon,⁸ in writing of acidosis in shock cases, remarks that any figure below 50 per cent in an adult indicates an acidosis. The critical level⁹ experimentally has been placed between 33 and 36 volumes per cent and it has been demonstrated that when there was a fall below the lower figure death usually resulted speedily. In view of such statements, the patients, whose combining power fell within and below the so-called fatal zone and yet recovered, demonstrate again the fine body adjustment mechanism toward protecting the individual when within the danger limits. These findings suggest a cause for the sudden deaths which occur in cesareans or other types of delivery, when before the mishap and yet when the anesthetic has been administered, death occurs suddenly. There will be no relaxation of the uterus or profuse hemorrhage, but the pulse suddenly softens, disappears, the blood pressure falls and the patient apparently dies of shock death type. It would not be amiss to ascertain the carbon dioxide combining power of plasma in all operative cases previous to operation and to guard therapeutically against disaster according to the indications given by the carbon dioxide reading.

The drop in plasma combining power indicates a decrease in bicarbonate reserve. The whole mechanism is graphically expressed in the equation of Henderson,¹⁰ the so-called physico-chemical equilibrium.



A change in any of the factors concerned will immediately shift the reaction either way. H_2CO_3 is the most easily disturbed and varied factor activating, and at the same time being regulated by the respiratory center. Body mechanism for diverting bicarbonate to or from the blood stream is largely accomplished by respiration and the maintaining of blood P_H level is aided by the blood buffers. Among these buffers none plays a more important rôle than hemoglobin by virtue of the reversible reaction $\text{H}_2\text{CO}_3 + \text{NaCl} = \text{HCl} + \text{NaHCO}_3$, the red cells control the basic carbonate and transport the larger part of the CO_2 to the lungs. In addition, the HCl probably passes into the cell

and is held there by hemoglobin and then when the equation would shift the reaction $\text{HCl} + \text{Na}_2\text{HPO}_4 \rightleftharpoons \text{NaCl} + \text{NaH}_2\text{PO}_4$ comes into play and the acid phosphate is excreted into the urine. Previously it has been remarked that the hemoglobin showed no special variation in these patients hence the question is still unanswered as to the cause of the drop of the CO_2 combining power of plasma.

The factors decreasing the body bicarbonate for the most part are the increased production or decreased elimination of acid substances; elimination by the urine; lack of oxygen; impaired or slowed respiration and hyperpnea.

The difficulties connected with accurate metabolism studies of pregnancies prevent a definite conclusion as to whether actually there is a marked increase of the metabolic processes which might in turn be employed to interpret the acidosis appearing in the charts. Laboratory workers¹⁰ have found that the energy metabolism in pregnant women expressed per kilogram and hour is but little larger (4%) than for women in complete sexual rest.

It is acknowledged that increased pulmonary ventilation will shift the balance of mass action toward acidosis. Magnus-Levy working with pregnant women before and during gestation¹¹ found a definite rise in oxygen consumption after the fifth month and attributed it to increased ventilation, increased cardiac work and some increase in absolute metabolism and development of the fetus. This might account for the changes taking place up until the time of labor, but at that particular time there are other factors entering into the matter. In labor, until the beginning of the second stage, there is definite work carried on by the uterine muscle and after the beginning of the expulsive stage the whole organism is working at top speed. It is a well known physiological fact that muscular activity will increase the excretion of carbon dioxide. Quite recently experimental work has demonstrated that with muscular exercise there is a definite drop of 5 to 10 volumes per cent of CO_2 .¹² The cause of the drop is supposed to be due to the accumulation and removal of lactic acid in the tissues. The blood bicarbonate is diminished when the CO_2 tension is increased and respiration is then inadequate to remove all the CO_2 produced in exercise. A continued diminution in arterial alkalinity would be due to an accumulation of lactic acid with a consequent decrease in the bicarbonate content. This brings up the question as to whether there would be a disturbance of blood phosphates sufficient to be detected by the ordinary means. Samples of blood were taken on the patients with the lowest combining power figures, during the time they were in labor and then postpartum when the carbon dioxide combining power had practically returned to its normal level and the figures as presented show no remarkable difference.

Phosphates of blood at conclusion of labor.	Phosphates of blood ten days postpartum.
3.3 mgs. per 100 C.C. of blood	3.7 mgs.
3.9 " " " " " "	4.1 "
4.0 " " " " " "	3.8 "

These figures prove merely that the blood stream mechanism for maintaining a balance is certain enough to guard the welfare of the patient and to keep the P_H within very definite and narrowly prescribed limits.

It seemed that in the patients with marked drop toward the acidosis side there would be change enough in the blood P_H to detect a change even though that change might be slight and transitory. Five patients were taken and the results are:

Vols. CO_2 per cent:	P_H reading:
50.5 %	7.3
41.4 %	7.3
44.3 %	7.5
36 %	7.4
39 %	7.3

These readings are proof positive that either there is no change or else the adjustment is so rapid that we are unable to get the readings when there is a decided swing either to the alkaline or acid side.

It would seem fair to assert that there was a definite increase of the pulmonary ventilation, for most women in labor, although it has never been definitely demonstrated, breathe more rapidly and usually more deeply. This is especially true when analgesia is employed, for then the patient is instructed to breathe deeply and is coached to inspire to her utmost capacity to escape sensation of pain.

A second factor entering into the problem is that of pain. The work of numerous men, especially since the war, has shown how closely trauma and pain is followed by shock, which in turn would give a definite decrease in carbon dioxide combining power. Cannon¹³ has shown in the war wounded, that the lower the blood pressure the lower will be the alkaline reserve, but he also mentions that he detected no definite voluntary hyperpnea until the combining power of plasma fell to 30 volumes or less. The entity of postoperative shock is too well known to require discussion and assuredly everyone who has been forced to do a difficult forceps or for some special reason has been compelled to finish the dilatation of a cervix, appreciates the results as shown by the patient. Rarely indeed is true obstetrical shock encountered when the patient goes through an apparently normal labor. Occasionally there will be a case where the onset of shock is sudden

with all the signs of profound depression with no evident cause for the collapse and in such a case recovery is spontaneous with a little symptomatic treatment or merely with rest.¹⁴ Pain¹⁵ does cause excessive breathing and an abnormal, extensive pulmonary ventilation which in turn causes the dropping of the carbon dioxide content of the blood. As far as operations are concerned in this factor, observations differ. One observer¹⁶ in researches found that with operations and anesthetics lasting, on an average, 52 minutes, the fall in carbon dioxide combining power of plasma was 12 volumes. Others¹⁷ say that most operations and anesthetics do not lower the combining power to the point where an acidosis is noted.

Ether and nitrous oxide with oxygen were the anesthetics employed and it is beyond question that anesthesia lowers the carbon dioxide combining power of plasma. The mechanism of the anesthetic reaction is based or explained¹⁸ on the ground that the disturbance is wholly due to disturbance of the respiration. Ether hyperpnea will drop the level to within the dangerous and fatal limits of 31 to 33 volumes per cent while, on the other hand, if the ether anesthesia is deep enough to cause a depression of respiration there will be a rise in the carbon dioxide combining capacity. A light irregular ether anesthesia is most dangerous to patients because it is most effective in reducing the carbon dioxide of the blood. This lowering is due to the excessive blowing off of carbon dioxide by the lungs and hence the tissue bicarbonate is not called out to combat the increasing acidotic blood and acid products. Unoxidized end products¹⁹ as aceto acetic acid and β oxybutyric acid are heaped up as a result of cell metabolism disturbed by the anesthetic, and death occurs suddenly with a fall of blood pressure, a failure of circulation and almost immediate cessation of respiratory function. It is of note in this connection that the CO_2 combining power of spinal fluid tends to remain at a higher level than that of blood plasma in cases of shock, an apparent protective mechanism so that the brain and spinal cord tissues are afforded an extra protection from either an acidosis or an alkalosis of the blood stream. Recently it has been proven also that not only is there an initial acidosis after the inhalation of anesthetics such as ether, chloroform and nitrous oxide with oxygen, but also after the inhalation of formaldehyde, pure nitrogen and pure oxygen.²⁰ The anesthesia would surely seem to bear a part in these patients because in each instance the anesthesia was of short duration, usually light and irregular since one had to be content with persons handling the anesthesia whose skill would vary.

The urine reports merely conform to the work that has already been done repeatedly, acetone and diacetic acid were found in practically every case where labor had lasted two hours or more. A slight trace

of albumen was usually noted directly after labor, probably due to muscular action just as the acetone is due to muscular action with an excessive breaking up of carbohydrates caused by effort. It has been previously remarked that there was no change in blood phosphates. It would be an interesting question to determine the P_H of the urine during and directly after labor, especially in view of recent work²¹ where the inference is drawn that the elimination of carbonic acid is directly proportional to the carbon dioxide tension of the blood. Some years ago²² a writer remarked that a diet producing an acid urine would cause a low carbon dioxide tension of the blood and this may bear a part for all patients who had a definite acid urine during the last trimester of pregnancy. Experimentally when acid phosphate is given,²³ there is a distinct decrease in renal urea excreting activity and a shift in the plasma toward the acid side with a decreased plasma CO_2 combining power. The body base too is saved in the elimination of phosphoric acid by reason of the fact that the P_H of the urine is much greater than that of blood plasma.²⁴

The difference between maternal and fetal blood is curious since we believe that osmosis is operating and that there is a free exchange of gases. The incidence of birth factors, pertaining to the infant and having a bearing on this question, would be dystocia with excessive head moulding, cerebral contusion, laceration or rupture of vessels, internal edema and cerebral congestion, pronounced fetal asphyxia such as compression on the cord with a resulting decreased respiratory stimulus, asphyxial lesions such as chest injuries, atelectasis, congested viscera (especially the adrenals), severe and rapidly recurring pains with the shutting off of fetal blood supply, and the beginning separation of the placenta as soon as the infant is born. No nerves as yet have been demonstrated in the placenta,²⁵ but it has been shown that the placental vessels have their action regulated directly, dilating from lack of oxygen and contracting when there is sufficient supply. While the fetus is *in utero* it is in a state of apnea. Its activities are limited and the gaseous exchange sufficient for its needs is carried out through an unimpaired placental circulation. During the actual time of labor and from the time the child is born until breathing well, there is doubtless a balance between the blood oxygen and carbon dioxide to keep it viable. Probably during uterine life the stimulus necessary to excite the respiratory center is much greater than after birth and the irritability of the respiratory center declines as the fetus approaches maturity. Feldman²⁶ accepts the theory that the center becomes increasingly more irritable due to the fact that the blood reaching the fetal medulla has an increased venosity due to the gradual narrowing of the ductus arteriosus. Partial asphyxia thus is approached and with the onset of labor and the interference of circulation in the

placenta by reason of pains, a state of asphyxia is established and thus the fetus passes from apnea to dyspnea. Any undue interference with the circulation over any period of time by reason of denying blood to the fetal medulla will paralyze the respiratory center so that it is with difficulty that the fetus is resuscitated if at all. It has been shown²⁷ that a gradual arrest of circulation will soon exhaust the respiratory center. All infants are born in more or less asphyxiated condition and we have both the external stimulus and the blood stimulus from accumulation of carbon dioxide working together to compel the child to breathe. Previous to birth his respiratory center has been less irritable and has been regulated by the maternal blood stream through the placenta, but at the moment of separation perforce he is thrown upon his own resources and upon an apparatus which is comparatively unused and strange to the task suddenly thrust upon it. These suggestions may account for the difference in the carbon dioxide combining power between infant and mother. It would be satisfying to take the blood from the infant sinus at the end of 12 and 24 hours when the respiration was well established and then to ascertain whether the figures were near normal or not. There is a definite lag apparently in the interchange, however, between mother and infant, although this may be partially accounted for by the beginning separation of placenta, for even though the cord is still pulsating the uterus may be shut down and interfering with the sinus exchange between mother and placenta. The low carbon dioxide combining power is interesting also in view of the fact that one of the blood buffers, hemoglobin, is abnormally high in the first few days of life and there might be a change in figures coincident with the drop in hemoglobin.

CONCLUSION.

1. There is a definite decline in the venous plasma carbon dioxide combining power of women during pregnancy and labor with a return to the normal level ten days postpartum.

2. The figures may drop to within the dangerous or even fatal limits, and still the patients recover, apparently always staying within the limits of compensated acidosis.

3. Excessive pulmonary ventilation due to increased metabolism, weight, pain, muscular exercise in labor and anesthesia, all have a part in producing the change in readings.

4. A certain proportion of sudden shock type deaths occurring in pregnant women in labor are probably of an acidotic nature and might be guarded against by regarding this factor of lowered carbo-dioxide tension.

5. There is a definite and constant difference between the plasma combining power of the mother and the infant.

6. The difference noted between mother and infant may be due to physiological lag at the placental barrier, partial asphyxia or an inadequate infantile apparatus for preserving equilibrium.

I wish to thank Dr. J. V. Taylor and Dr. McLuggage of the Biochemical Laboratory for their kindness in the chemical determinations.

REFERENCES.

- (1) *Henderson, L. J.*: *Ergebn. Physiol.*, 1909, viii, 254. (2) *Lundsgaard, C.*: *Biochem. Ztschr.*, 1912, xli, 247. *Hasselbach, K. A.*: *Biochem. Ztschr.*, 1911, xxx, 317. *Parsons, T. R.*: *Jour. Physiol.*, 1917, li, 440. (3) *Parsons, T. R., and Shearer C.*: *Jour. Physiol.*, 1920, liv, 62. *Collip, J. B., and Backus, P. L.*: *Am. Jour. Physiol.*, 1920, li, 551. (4) *Van Slyke, D. D., and Cullen, G. E.*: *Jour. Biol.*, 1917, xxx, 289. (5) *Pflügers Arch.*, 1884, xxxiv, 173. (6) *Krönig and Fütche*: *Monatsschr. f. Geburtsh. u. Gynäk.*, 1901, xiii, 39. (7) *Stodie, W. C., and Van Slyke, D. D.*: *Jour. Biol. Chem.*, 1920, xli, 191. *Harrop, G. A., Jr.*: *Jour. Exp. Med.*, 1919, xxx, 241. *Smith, L. W., Means, J. W., and Woodwell, M. N.*: *Jour. Biol. Chem.*, xlv, 1920, 245. (8) *Cannon, W. B.*: *Jour. Am. Med. Assn.*, 1918, lxx, 531. (9) *Henderson, Y., and Haggard, H. W.*: *Jour. Biol. Chem.*, 1918, xxxiii, 364. (10) *Carpenter and Murlin*: *Arch. Int. Med.*, 1911, vii, p. 184. (11) *Magnus-Lavy*: Quoted in *Metabolism and Practical Medicine* by v. Noorden, Heineman-London, 1907, i, 378. (12) *Lundsgaard, C. and Möller, E.*: *Jour. Biol. Chem.*, 1923, lv, 477. (13) As in (8). (14) *Muret*: *Schweiz. Med. Wehnschr.* Basel, 1923, liii, 14. (15) *Henderson, Y., and Haggart, H. W.*: *Jour. Biol. Chem.*, 1918, xxxiii, 355. (16) As in (8). (17) *Reinam, S. P., and Bloom, G. H.*: *Jour. Biol. Chem.*, 1918, xxxvi, 241. (18) *Henderson, Y., and Haggart, H. W.*: *Jour. Biol. Chem.*, 1918, xxxiii, 345. (19) *Collip, J. B., and Backus, P. L.*: *Am. Jour. Physiol.*, 1920, li, 568. (20) *Cullen, G. E.*: *Scientific Proceedings Soc. Biol. Chem. at Toronto*. *Austin, J. H.*: *Jour. Biol. Chem.*, 1923, lv, Notes p. 42. (21) *Gamble, J. L.*: *Jour. Biol. Chem.*, 1922, li, 295. (22) *Hasselbach, K. A.*: *Biochem. Ztschr.*, 1912, xlv, 403. (23) *Nagayama, T.*: *Am. Jour. Physiol.*, 1920, li, 434. (24) *Henderson, L. J.*: *Harvey Lectures*, 1914, 1915, x, 133. (25) *Müller, S.*: *Med. Klin.*, Berlin, 1922, xviii, 1528. (26) *Feldman, W. M.*: *Principles of Antenatal and Neonatal Physiology*, London, 1920, Longmans, p. 441. (27) *Luciani, L.*: *Human Physiology*, London, H. & S., 1911, p. 479.

THE BROADER ASPECTS OF THE BIRTH CONTROL PROPAGANDA AS IT SHOULD INTEREST THE PHYSICIAN*

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ON an evening devoted to a consideration of the sociological aspects of our specialty, it seems appropriate that attention should be accorded to the propaganda popularly designated as "birth control." As physicians we are expected to lend aid and encouragement to all propaganda for the betterment of social conditions. But whether we ought not to regard the present-day movement about to be discussed, as "agitation" rather than "propaganda" may well demand further inquiry. There are so many points of view to this subject that the brief time allotted hardly suffices to present anything more than a very superficial review of the situation. Perhaps it would be better therefore to separate the more technical aspects from those of a general character and to speak of the propaganda or agitation as it affects, or as it should be of interest to the medical profession. Unfortunately the laity, and a certain number of physicians, regard the objections which have been made in medical circles to any public and indiscriminate dissemination of contraceptive information, as based on selfish motives and do not give credit to the objectors for a possibly deeper insight into the various phases of the question, which is based less on sentiment and more on reason.

Let us consider for a moment what are the possible motives behind an agitation which has absorbed so much public attention and has now developed into an endeavor to change the Federal and State laws that are claimed to limit the proper spread of birth control knowledge. A mass of literature has been published by various organizations that have taken upon themselves the solution of the problem for relief from what they consider an interference with personal liberty, by appeals couched in the broadest language and directed towards public sympathy rather than public sense.

The arguments advanced by these reformers, professional and otherwise, organized into various leagues and societies for the protection of motherhood or voluntary parenthood and with other high sounding titles, have vacillated between fears of possible human overpopulation and the declaration that a woman shall have the right to say how many children she shall bear, and at what time. It is very essential to separate real and true arguments from those that may be nominated as

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fancied. Students of the subject have claimed that overpopulation will sooner or later bring about all sorts of evils in its train. They do not seem to take into account, however, that it is not only overpopulation alone which determines some of the factors from which they seek relief by a restriction in the size of families. They are very fond of quoting the Chinese and similar horrible examples of what takes place when overpopulation occurs, but they do not seem to realize that there would be no overpopulation in China if its many peoples could be spread out over that vast country. It is the crowding and herding of the Chinese population along the waterways and the inability to feed them because of the sterile character of so much of the country, due to man's own devices, that the unfortunate condition of a large portion of the Chinese population has been brought about. The Malthusians have developed, to them, an impregnable form of reasoning by which they attempt to show that food, among other things, will become insufficient unless checks are placed on the present so-called overgrowth of the people of the earth. But despite the prediction of Malthus and his followers, the food supply per capita is greater and more varied now than in his day, or for many years after. Such reasoning is defective in many respects and we must not lose sight of the fact that a normal increase in population is largely dependent on natural causes and that the size of any individual family cannot be taken as a criterion in assuming that all marriages are necessarily accompanied by a brood of children. The individualistic conception of marriage and children is always brought into the foreground and the heartrending description of a mother subjected to frequent childbearing that is beyond her strength and means, is a favorite picture to solicit sympathy and contributions for the many organizations that have taken upon themselves the task of adjusting our social conditions in this respect.

One would think that the millennium could be reached if only parenthood could be made voluntary rather than accidental. It is claimed that the first step toward that end demands the removal of the words "preventing conception" from the Federal obscenity laws "which now besmirch and degrade the question of intelligent parenthood by including it with penalized indecencies." Moreover one of the leading organizations has for its object "the education of parents so that the birth of children may occur with due regard to health, heredity, income, choice, environment and the well being of the community." And how is all this to be brought about? Merely, it would appear, by the public dissemination of so-called birth control information. All restrictive laws whether they are embodied in our postal code or in our various State codes should be wiped out. Under the guise of permitting medical men to be allowed to give such information to their

patients, it is hoped that this privilege may likewise be granted to trained nurses and other volunteer workers. Just as soon as a mother, or a prospective mother, is acquainted with this knowledge all care and worry connected with the marriage state would cease. Children would come when, as, and if desired, and otherwise the natural attraction of the sexes toward each other could be indulged in without fear of consequences. But is this happy state in accord with what we meet with in our daily observation of cases, or nations for that matter, where birth control, so-called, is widely practiced?

France is often referred to as the land where birth control methods have reached the highest point of development and France's record during the war is pointed to as a most recent evidence of what a country thus controlled can accomplish. This is hardly in accord however with the efforts which France herself is making to overcome the reduction in her birth rate. Nor is it in accord with the large families of the French rural and small city population.

In this country the birth rate in our native born population has materially decreased with recent decades and the so-called intellectual classes are credited with about one child plus. No deep thinking is needed to show that a one or two child family as a standard will soon cause a halt or even step backward in our national growth. Intellectuality as a trait is known to be liable to atavistic tendencies, or less politely speaking, to revert to type. We therefore require for replacement purposes, and must depend on the urge from below as it were, from families where the numbers in their progeny result in a struggle that naturally selects the fittest and places them in a position to supplement the intellectual generation that preceded them and perhaps failed. This may be regarded as exaggerated, yet it is but the working out of natural and economic laws, and as physicians our teaching should lead us to see how hopeless and futile it is for man to control such matters beyond a very limited extent.

After several years abstention from this subject I found it necessary by way of preparation for this paper to take up again the voluminous scattered literature on the subject of birth control. Notwithstanding a claim to some familiarity with the subject, I must confess a lack of understanding or appreciation of most of it. One gains a rather mixed impression from such reading. On the one side of the discussion the more numerous and vociferous, a gathering of sociologists, society leaders, uplifters, reformers, and radical thinkers of every type, with a few doctors,—on the other, in opposition, the clergy, mostly Catholic, and a few more doctors. One is surprised there are not more members of the medical profession to give either their sanction or their objecting voice. Let us consider briefly the two opposing camps and their arguments.

It has seemed to me that there are two general classes of "birth control propagandists." In the first group we find a considerable number of literary persons, sociologists, eugenists, publicists, and a few physicians, who earnestly and sincerely believe that the evolution of the human race in other phases demands equal attention to one of its most important functions, namely, the reproductive processes and that the element of chance and accident should be eliminated in the development of the family. It is claimed that biologic growth in the animal kingdom has changed the wasteful production in the lower forms, as the million progeny of the fishes, to the simple embryo of the higher mammals, brought into the world quite fully developed, yet requiring the further sustaining and protective powers of its maternal and paternal progenitors. This group claims that rational and scientific birth control is not the fixing upon the race of a new and unfamiliar practice or policy, but is rather the scientific correction of a practice now followed by the majority of married persons in civilized countries, though in a bungling, unscientific and frequently a harmful manner (Armstrong). They seek to replace these by scientific, harmless, approved methods and under sanction of the law rather than contrary to it. In this view they find nothing immoral, nothing selfish, and although admitting that all this would lead to a lower birth rate claim it would also lead to a lower death rate: As Havelock Ellis has said, "The fewer the children born, the fewer the risks of death, disease and misery to the children that are born." The members of this group believe that quality rather than quantity is the racial ideal, and that the science of eugenics or racial hygiene should be accorded greater attention, so that racial selection instead of being carried out by the "destructive, wasteful and expensive method of elimination, through death," shall in the future be "carried out more effectively by conscious and deliberate selection." One writer (Glaton) who admits the futility of legislation to elevate the race, believes that the hope of the future is in eugenics becoming a part of religion, that the good of the race lies not in the production of a superman, but in a superhumanity. This group of writers and thinkers says little or nothing about birth control from the narrower medical standpoint, as in the presence of constitutional disease or infirmities. They seem to be interested rather in the question of family limitation.

A second, more radical, group is made up largely of well meaning but usually misguided lay persons, carried away by sentiment and aided and abetted by a peculiarly constituted class of individuals, always ready to take up anything new in the way of reform so-called, for their personal aggrandizement and often for their personal gain. A harrowing picture is drawn in their circulars of

the evils of "reckless" childbearing, that children should only come when desired, that mothers will necessarily become slaves and drudges unless shown how to avoid conception, that child labor, prostitution, abortion, the deaths of countless mothers and babies will all be prevented and that the home will be a "place of peace, harmony, and love," if only those annoying Federal and State restrictions could be abolished which now stand in the way of the aforesaid well meaning persons and their organizations, broadcasting scientific, safe, and harmless means for avoiding conception to suffering mothers and anxious fathers. Nothing more is needed to bring on the millennium if only trained nurses and social workers could without legal restraint disseminate such knowledge freely to a receptive humanity. Their literature is very convincing and many of their tracts throw into the deepest shadow some of the blatant advertisements of medical quacks and others who have come under the ban of the propaganda department of the American Medical Association. Moreover a perusal of the lists of names backing these ventures will be found to contain those of many well-known radicals in other lines of thought, as well as professional reformers ready to seize upon any propaganda which will secure them a "job" as managers or directors. It pays to advertise. And with it comes the cry for funds, funds and more funds, all to be expended, at least so their circulars state, for influencing legislators to change certain portions of our federal and postal laws and state penal codes.

To the physician, who is in a position to be acquainted with the facts, the assurances of infallibility claimed by the propagandists for their contraceptive measures, verges on the ridiculous. We all know how uncertain most contraceptives are and that assurances cannot be given to any patient that the devices or methods are free from danger to themselves or are absolutely certain of prevention of conception. We hear much about scientific, harmless and efficacious methods and devices which are supposed to be the private property and knowledge of the medical profession. It would be interesting to canvass physicians to find out what these measures are. My own confession of a lack of personal knowledge will undoubtedly be echoed by other members of the Society. It is true that we can make certain recommendations and that we can suggest the use of contrivances that may prevent conception but more than this we cannot do, and any guarantee is an assumption not borne out by facts and experience. But the laity to whom the appeals are made is misled into believing that this knowledge is kept from it for selfish and personal reasons. Such an attitude of course is ridiculous but it serves the purpose of those who desire to attain their ends even at the expense of deception.

The foregoing is but a brief reference to the affirmative side of the

argument. One rather questions the sincerity of much of it—those who are giving the funds are probably sincere and well meaning—can as much be said for those who are spending them and to whom “reform” spells the breath of life?

Let us refer, also briefly, to the other side of the argument. The very appealing circulars and other documents published by the various associations who have endeavored to correct our legislative failings are somewhat difficult to answer because little has been published in opposition either by lay or medical writers, and the only consistent activity is that manifested by the Roman Catholic church. It is quite needless to go into the latter's attitude more freely except to call attention to the fact that while the Catholic church positively and vigorously condemns and prohibits the use of contraceptive measures, its representatives are careful to state that they do not question the lawfulness of birth restriction through abstinence from the relations which result in conception. Of course this attitude can only affect the members of this particular church and thus far no other religious organization has officially made public any decision on the subject. But we must not forget that religious ideals have changed since their formulation in the early days of Christendom and divine commands so plentifully employed in the first centuries after the establishment of the Christian religion, no longer govern our social standards. Ideals of human betterment result rather from an appeal to reason and judgment and involve restraints of impulse which are dependent on knowledge received from experience. The direction to “increase and multiply” must be regarded merely as a tradition in this day when the population of the earth has reached limits that must have been unfamiliar to the early prophets. True religion has become more vitally concerned with the relation of man to man and the welfare of society in general.

Taking up the medical side of the argument, we may assume that there can be no question or difference of opinion regarding the necessity for contraceptive measures in certain cases. The tuberculous, the cardiac, the nephritic are only among the more common general illnesses that demand abstention from childbearing, and there are local or obstetrical situations that must likewise be considered. But this is a small group as compared with that in which a personal or an economic factor is the leading one and for whom our birth control organizations are also endeavoring to find relief. Just how far we ought as physicians to go in prohibiting sexual intercourse among our patients for nonmedical reasons, is a question to be most carefully considered. No one has yet conclusively demonstrated that sexual abstinence, partial or complete, is fatal or even dangerous to health. We forbid tea, or coffee, or tobacco, or red meats, exertion and excitement, and

many other things—it is no more illogical to forbid intercourse in certain constitutional diseases in husband or wife, or to limit it in others. It seems to me that we have little right to go beyond these limits. The sex “urge” is claimed to be too strong for mere human control, but yet how often do we see it curbed in athletes in training, without ill effects.

Artificial restrictions in normal sexual intercourse particularly in the early months of married life may produce serious consequences in a woman's pelvic organs and either lead to subsequent sterility or actually hide the presence of the latter condition for a period during which something might have been done to relieve the same had its existence been known.

The fear of pregnancy especially among the unmarried, has been widely ridiculed as an objection to the dissemination of contraceptive knowledge, insofar as it may be regarded as a protective factor in maintaining morality and virtue. Nevertheless it is and will continue to be a very practical factor. However, if we as medical men regard birth control from the standpoint of morality or immorality we are venturing on a domain that we are scarcely qualified to discuss from any but the narrowest viewpoint. As physicians we must theoretically condemn illicit sexual relations because we know of the possible pathological consequences, but beyond this we cannot go—fornication has not yet been labelled a crime. However, our training and our study of the human mind and its frailties make us fully cognizant of the dangers that would result from any lack of restrictions to contraceptive knowledge such as that advocated by the birth control propagandists insofar as this moral status is concerned.

The physician, however, is drawn into the discussion by a direct appeal to his opinion whether contraceptive methods are injurious to health and this is a difficult question to answer offhand. There are no doubt many practices and methods which affect the health of the participants, but whether the so-called harmless procedures manifest any such influence no one can definitely state. It is entirely a question of individual trial and application and demands study based on statistics and observations which are not yet on hand.

There are many who interpret a system of birth control as leading to race suicide, and that it is the duty of the physician because of his interest in such questions to counteract the prevalence of this idea. I believe that the proponents of birth control rather exaggerate this matter and that other factors are at work which they do not recognize. This leads one into speculative fields that would take more time to discuss than we are permitted.

It has been estimated that in order for a nation to maintain itself without increase or decrease, the average family must consist of at least

four children. This in order to compensate for a death rate of about 10 per cent during the first year of life. The national census (1900) shows that out of 100,000 individuals born, only about 78,000 are alive at the average age for marriage. But not all of these people marry, from 12 to 15 per cent do not, and about 7 per cent of all marriages are sterile. The truth of these facts must be evident to all of us, and if we place further restrictions, by official sanction, on the natural reproductive processes, the displacement of the better groups by those less economically and socially sound, will be even more rapid and standards will be correspondingly levelled. We need rather a system of birth release than a system of birth control.

I have endeavored to present the pros and cons of this important subject in as few words as possible although in doing so I must acknowledge my failure in not adequately taking up all phases of this broad subject. As physicians and particularly as obstetricians it devolves upon us and perhaps the public may expect from us, some formal expression of opinion as to our attitude for or against the general proposition of birth control. I believe that most of us feel that exaggeration, deliberate or accidental, has characterized much of the agitation now so widespread. As a group of specialists perhaps more directly concerned than any other, should we do anything to alleviate this exaggeration? It seems to me that we have this duty and should not shirk it. Whether our advice will have any weight is, however, problematical. As the greater part of the agitation on the subject seems to deal with a desire to do away with legislative restrictions to the dissemination of birth control information, we should perhaps first express ourselves on this point. The Federal Penal Code, section 211, does not really label birth control information as obscene matter although we are being led to think so, but from what is known of the general character of contraceptives distributed through the mails, most of such devices cannot be designated in any other manner. The Penal Code of the State of New York, sections 1141 and 1142, practically duplicates the Federal law, providing for a fine and imprisonment for any offence against the same. At the same time our State statute provides for the physician's participation in legitimate contraceptive measures and the Court of Appeals of this State has likewise decreed that no physician could, or would be, molested in the legitimate practice of his profession as it involves the dissemination of birth control information. But this evidently is not satisfactory to those who desire unlimited and indiscriminate dissemination of knowledge that they claim is being unjustly kept from the people at large.

Expediency must guide many of our actions and experience has shown that the inclusion of the laws referred to have done more to

keep this country free from undesirable literature, indecent pictures, and other things, than any other factor except perhaps the generally prevalent high moral standards of this great nation. It seems to me therefore inexpedient to release for public information without discriminatory precautions, information that would in the end be most detrimental to many of our people. Yet we must recognize that this exaggerated state may be based on a true desire which is in accord with so many developments of the present day that would have been frowned upon half a century ago. Among these none looms up larger than the greater freedom accorded to women—the right that they shall have an equal voice in government, in the making of laws that apply particularly to their sex and in the decision finally to have children when they see fit. This change in the psychology of women must be taken into account—we cannot as men pass it over with the assumption of a superior sex. Yet I think we can lead the thought into the right direction and it is to this purpose that we must lend our energies.

It seems to me that it would be much more desirable and valuable for us as physicians to regard the larger question of birth control, or the smaller one of contraceptive measures from the standpoint of fertility of the race. Smaller families and fewer and better children appeal to one as of greater value to the community than reckless childbearing, but the question remains that we may ineffectually inculcate notions into the minds of people who are not in a position to observe, to understand, or to practice them. It will require more than the mere doing away with restrictive legislation or the founding of so-called birth control clinics presided over by well meaning women to solve this problem. It must rather be done by a process of education applied both to the individual and to the mass—education which begins with the training of our school children in the meaning of sex and reproduction, just as we train them in the ordinary rules of hygiene governing their digestion. At the same time it may be possible for us to formulate not laws, but opinions, not contraceptive clinics, but attempts to control policies and methods. The close personal relation between physician and patient should never be set aside and the profession should not ally itself with any state or municipal controlled or even private lay institutions organized for this purpose. It would be better if the profession could bring about such a change that every hospital and dispensary organized for the treatment of gynecologic or obstetric patients, would be in a position to take up with its individual applicants the desirability of restricting pregnancy in the presence of definite pathologic indications rather than those of an economic nature. This feature of course only includes that class of our population who would naturally apply to dispen-

saries and hospitals for economic reasons. There is no need for us to attempt any change with respect to our private patients because we are already in a position to deal with them as we see fit. It has been suggested that clearing houses be established from which applicants can be referred to physicians or hospitals. There is much to be said for such a plan and yet will it not unduly draw public attention to a matter that had better be managed in a less open manner? Much thought and much consideration would have to be given to a project of this kind before the profession as such could lend its support. Consideration would have to be given by our special societies and perhaps by a conference of hospital managers with the leaders of medical thought and opinion.

In the meanwhile attention may be called to what has been done by our sister organization in Chicago, which under the terms of a resolution passed at one of its regular meetings made a personal canvass of its members and as a result published a series of very direct and plainly worded resolutions.

The substance of this investigation shows the Chicago Gynecological Society to be unalterably opposed to the public dissemination of contraceptive information, which should only be furnished by physicians either privately or in existing clinics and dispensaries. Special clinics for this purpose are believed to be neither necessary nor desirable, nor should nursing organizations be utilized for the purpose. It seems to me that the New York Obstetrical Society should undertake a similar canvass of its members and that a committee might likewise be appointed for the purpose of making such a study.

As I have attempted to bring out in my paper, we cannot as physicians avoid our responsibility in this matter. As a group we are legally empowered to render to our patients whatever assistance we can in the solution of their problems. We should not be expected to go beyond the point of propriety and reason in the giving of such advice and I believe firmly that as physicians we should object to the invasion of this field of medical practice by unqualified lay persons, which would result from the sweeping changes in the present laws on this subject.

23 EAST NINETY-THIRD STREET.

(For discussion, see p. 351.)

PRENATAL CARE AS VIEWED FROM THE PUBLIC HEALTH STANDPOINT*

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IN studying the question of maternity in this country, we are brought face to face with certain basic facts:

First, that the registration area, upon which the United States census for mortality and births is based, is far from complete and that there is an evident lack of uniformity in tabulating results. In the 1920 census, the death registration area included 34 states, the District of Columbia, 16 cities in nonregistration states (cities showing accurate registration in 90 per cent of all deaths) and the Hawaiian Islands, although the latter are not concerned in any figures that we may consider. In only two-thirds of these 34 states is there definite, reasonably accurate birth registration. It may be a surprise to some, moreover, that it was not until the year 1915 that such a birth registration area was established in the United States.

As illustration of what I call lack of uniformity in tabulation, I may cite:

a. The lack of uniformity in the registration of stillbirths. No definite, widely accepted standard as to what constitutes a stillbirth has as yet been accepted.

b. The United States mortality records for maternity are based entirely upon the number of *live* births and not upon the *total* number of births, while in a state like New York or in a city like New York, stillbirths are included with live births.

c. Records of the neonatal death rate, for the first two to four weeks of life, are almost unbelievably scarce; in other words, the records are still, in general, far from complete.

In the *second* place, even if we disregard the statements of the sentimentalist or the enthusiast in this field of social welfare, we are forced, I believe, to acknowledge that the general standards in this country, as applied to maternity, are still far too low and, furthermore we are forced to the conclusion that many of the dire results are dependent upon faulty methods of dealing with an unquestionably difficult problem.

The 1920 United States census showed a mortality of 80 per 10,000 live births, a figure surely much too high, while in New York State in 1921 there occurred 1,382 deaths of mothers connected with childbirth, or a rate of 50.9 per 10,000 live and stillbirths. There is positive

*Read at a meeting of the New York Obstetrical Society, March 13, 1923.

reason for the belief that with improved prenatal and intranatal care, such figures can be very greatly reduced.

Third, one cannot but be impressed by the almost universally prevalent high death rate throughout the world from puerperal sepsis.—5,800 cases were reported in the United States census area for the year of the 1920 census, a rate of 27.5 per 10,000 live births. The number must have been very considerably larger than this, moreover, both because of incomplete registration and because many cases, no doubt, died long after delivery as a result of an obstetrical infection. In New York State 395 women died from puerperal infection in 1921, that is, about 30 per cent of the total number of maternal deaths. While poor care at delivery or just after will account for much of the sepsis, it does not account for all.

It is gratifying to know, however, that New York City stands well in the lead of other cities in the United States, in its percentage of septic deaths.

The *fourth* example of unsatisfactory care is to be found in the appalling wastage of infant lives as a result of abortions, prematurity, syphilis, bad management in labor and congenital debility—the latter so frequently dependent upon pregnancies occurring in too rapid succession. In 1920, 4.2 per cent of the babies born alive died under one month of age in the United States registration area. Including with this, the average stillbirth rate, we find that up to the end of the first month, actually 8.4 per cent of children are estimated to have lost their lives. Out of the 8,464 children who died in the State of New York in 1921, outside of New York City, 4,681 or over one-half did not live through the first month of life. In fact, of all the children, 2,008 or 24 per cent, did not live through the first day of life, and 4,124 or about one-half did not finish their first two weeks of life. This makes it clear according to the State Department of Health report, “that the dangers to the new born child are greatest immediately after it is born. Its security from sickness and death becomes greater with each day that it lives, therefore, efforts to prevent this loss of child life, to be highly effective, should be given to the mothers before the children are born, and painstaking care must be given the new born child, during the first few days and weeks of its life.”

Of all the causes of early infant deaths, prematurity stands at the head of the list with 22.1 per 1,000 population under one year of age; congenital debility 8.9; injuries at birth 4.9 and syphilis 1. In the State of New York we find again that the chief cause of death in children under one year of age is premature birth. Out of the total 8,464 babies who died under one year of age in the up-state area, 26 per cent died as a result of prematurity. In a maternity welfare pro-

gram, education is the key-note to success and *prevention* the most satisfactory of all handmaidens.

In discussing the "value of prenatal care" in terms of mortality rates alone, obviously many faulty and incomplete deductions can be made. Gross mortality rates will include the whole period, from the first registration to one month postpartum, while "mortality rates" referred to, for the purpose of evaluating prenatal care, must of necessity be "*corrected* ones." It is quite illogical to confuse the issue and to exaggerate the results of such care, remarkable as they are. Aside from the reduction in mortality rates, the actual saving in invalidism of both body and mind is immeasurable, by logical and scientific care during pregnancy and labor. The amount of such reduction unfortunately cannot be estimated on paper but the facts are so well known to all of us, in our own individual experiences, that there is little doubt that the same must hold true when dealing with greater numbers.

Prenatal care, as I have said, is primarily and foremost educational in character. It teaches the patient that while pregnancy is, *per se*, physiological, it may readily become pathological. It teaches the importance of early care and of early reporting, to either doctor or nurse, of all unusual symptoms. The patient should learn, moreover, before the birth of the child, the first lessons in the care of the newborn and the very great importance of maternal nursing. The more each individual patient comes in touch during her pregnancy with a competent social worker or nurse, trained in this special branch, the more likely will she be to demand the best care at delivery that the family budget will allow. The nurse or social worker going into the patient's home is an invaluable asset. We have already reached the point where we feel we cannot do without her; for after all, the more personal and the more human the contact, the more satisfactory will the results be.

From purely a medical aspect, the chief value to the mother, of prenatal care, rests upon:

1. The early determination of definite medical abnormality; of pelvic tumor or of other obstetric difficulty. In medical pathology, tuberculosis and Graves' disease seem to be most susceptible to the unfavorable effects of pregnancy.

2. The early detection and treatment of the toxemias of pregnancy. The diminution through prenatal care in the number of toxemias with or without convulsions, both as regards actual deaths as well as in the degree of severity, is so marked that this diminution alone will justify enthusiasm for the work. Nurses in particular may be so trained that they really become remarkably expert in detecting the early changes from the normal. It is the writer's belief that the pro-

fession, as a whole, does not as yet fully appreciate the extent of the damage to the patient's health, in this group of cases.

3. The early recognition of the importance of uterine bleeding. Here the one great lesson to ever bear in mind is the importance of all bleeding during pregnancy.

4. The detection of syphilis and, if present, vigorous antisyphilitic treatment. Hospital services and organizations specializing in the care of expectant mothers should make strenuous endeavor to carry out routine Wassermann tests. This is a great burden but results fully justify the effort required. Competent authorities have estimated that from 8 to 10 per cent of expectant mothers of the class that go to our public maternity wards give a positive Wassermann reaction. By treating specific mothers, a surprisingly large group of babies of these mothers will be saved—50 per cent at least. Gonorrhea is probably one of the most common causes for early abortion and should be carefully treated when discovered. Both stillbirths and neonatal death rates will be definitely influenced, therefore, by these measures as well as by the early recognition and treatment of the toxemias of pregnancy. So far as the offspring is concerned, prenatal care, and prenatal care alone, will diminish the shocking number of abortions and premature births. Owing to the lack of uniform standards in the classification of prematurity, virtually no reliable information is at hand as to just what the irreducible minimum can be.

In a campaign for prenatal care the need for clean, efficient delivery service should not be overlooked. The dangers to both mother and child in labor are very real. To the former the greatest are from hemorrhage and sepsis, to the latter from cerebral hemorrhage and pressure on the umbilical cord. As the Maternity Center Association, in its recent statistical study has so well shown, the best oversight during pregnancy may be vitiated from the standpoint of mortality statistics by unsatisfactory delivery results.

These, then, are some of the factors to be borne in mind as we turn to a brief survey of the methods dealing with maternity relief for the masses. Certain definite conclusions may safely be drawn from our study: *First*, the physician handling maternity cases should be required to possess greater knowledge than he does today and until such knowledge has been obtained he should be brought to the generous viewpoint that abnormalities demand the attention of the specialist and that such cases should preferably be treated in hospitals. This is the ideal to look forward to but, gentlemen, specialists in obstetrics and hospitals for maternity cases seem often impossible to obtain. Both are sadly lacking in large sections of this country and it is your duty and mine to use our best efforts to devise some method of relief. The hardest feature of obstetrical

consultation practice lies in the fact that all too often the specialist is not called in until virtually all chance of success has vanished.

In many ways, in large communities, we are highly favored and we are prone to forget the vast stretches and the several thousands of communities in which there *is not one hospital* excepting perhaps for the insane, the crippled or the tuberculous.

Second, the midwife is still an economic necessity in many sections of the country, but she should never be permitted to practice unless licensed and efficiently supervised.

My *third* conclusion, from studying this work is "that improved methods" for widespread prenatal care and follow-up work, are urgently needed.

The three agencies upon which the burden falls of supplying this need are:

1. Private welfare agencies, organized to promote safer maternity.
2. Maternity hospitals.
3. Municipal, state or the federal government.

Lay Organizations.—Lay organizations which have taken upon themselves the function of promoting public health in various lines, frequently become the target of harsh criticism. In matters pertaining to maternity, such criticism has at times been acrimonious and particularly was this true before the passage of the so-called Sheppard-Towner Bill. In the words of Dr. Briggs, "Such lay organizations, however, considered together unquestionably generate, conduct and apply a great volume of dynamic, democratic energy for the advancement of public health. The conviction is now generally held that the best services of private health associations can be rendered in the field of pioneering, experimentation and demonstration and especially in the education and direction of public opinion in support of the public authorities. On the other hand, we are agreed, I think, that matters of actual administration should be left to duly constituted health officials."

Among the conspicuous examples of lay organizations that are carrying on extensive and advanced maternity welfare work I might mention the Maternity Center Association of Manhattan; that of Brooklyn; the Visiting Nurse Association of Boston, and the Visiting Nurse Society of Philadelphia. These lay organizations must naturally have the strongest kind of medical backing and guidance. There is no question that they have been *primarily responsible for awakening* the public in general to the need of providing better supervision for the expectant mother.

Hospitals.—Hospitals with maternity services should be so organized as to meet the need of the community, as far as is possible. Obviously in very large communities they cannot accomplish this without out-

side assistance. In New York City, in fact, to rely upon the hospitals entirely would be impossible; then again, many cities of the second and third classes have no maternity services at all. Yet, I say, hospital authorities should be awakened to the need of developing a social service department, either with trained nurses or social workers, and each hospital should be willing to conduct each week, if necessary, at least one *open consultation clinic* for expectant mothers who need proper advice but who are to be confined in their homes by other than hospital aid.

Even in New York City, maternity hospitals have only had a reasonably adequate follow-up system for a comparatively short time, and to a limited number. In each hospital district there should be an outdoor service, to assist in caring for the large numbers who cannot or will not go to the hospital for delivery. Normal multiparae should be delivered at home. Such a scheme is expensive but it will add much to the value of the hospital in the community. To carry on such outdoor service, both students and nurses are necessary and students and nurses are not always available, particularly in the small cities. With properly equipped hospital services, with the demonstration of lay organizations and with active health departments, the ground can be safely and satisfactorily covered, but many towns and smaller cities—in fact some larger ones, have very backward health departments.

The question, however, which calls for greatest consideration and deepest thought is the situation present today in the vast rural districts and small townships which are poorly supplied with doctors, hospitals or nurses. The situation right here in New York State is, in many sections, unsatisfactory to put it mildly. Throughout rural sections practically nothing is being done except in a very few thickly populated counties, notably Erie, Dutchess, Livingston, Monroe, Nassau, Rockland and Westchester. In New York State alone there are, at the present time, many municipalities which have no physician and a number of cases have been reported where no physician could be obtained. Sometimes a nurse can reach these women but in most cases there are only members of the family or a neighbor in attendance. (Child Health Survey by Dr. S. Josephine Baker and Dr. Dorothy Kempf.) While time will not allow me to review the actual situation, I would impress upon you the fact that we who live here in a city like New York with a wonderful Department of Health and unusual hospital opportunities, fail to realize the extent of the need and the many difficulties in this branch of public health work. It is here that state or federal aid is being offered and in the writer's opinion, quite rightly. The help in general is *not help plus*

dictation so much as *help* offered through *education* and the *giving of assistance* when asked for.

New York State under the Davenport Bill has undertaken a wide educational campaign by means of health officers, public health nurses, pamphlets, moving pictures and actual demonstrations when called upon to give such demonstrations, by individual towns or municipalities. The physicians, mark you, are the leaders in this movement and have absolute control. This cannot be disputed, providing the situation is faced honestly. So far, New York State has preferred not to accept the provisions of the Sheppard-Towner Bill, but, as perhaps some of you know, a movement is on foot to change the state's policy in this respect and to accept federal money, providing the machinery, so ably set in motion by Dr. Hermann Biggs and Dr. Florence McKay, is not disturbed. The chances are, I understand, unfavorable to such action.*

Up to November 1, 1922, 42 states had accepted, in general, the provisions of the Sheppard-Towner Act, six states had not. These are New York, Maine, Massachusetts, Rhode Island, Louisiana and Washington. Nineteen of the states accepted the provisions by legislative action and 23 by action of the Governor pending legislative action. It is not my wish to start a discussion regarding this Act. It is now on the statute books. But I myself do not hesitate to say that, so far at least as rural sections go, no improvement in maternity care will be brought about without some form of state assistance. The ideal development for rural sections as well as for small townships would be a centrally located hospital of moderate size which could be equipped in a thoroughly up-to-date yet simple manner with a small group of able, energetic, young practitioners who would have working with them a staff of district nurses and social workers. Such nurses should be trained by a special course in midwifery and should be able, where physicians are few and far between, to handle the normal cases. They should be able to recognize reasonably well, with practice, the presence of abnormalities and such cases would then, by calling an ambulance from the hospital, be rushed to the specially trained physician at the hospital. This scheme while apparently expensive is not at all impossible to develop. It is the only solution that the writer can see for the rural problem. If the municipality or the county will not awaken to such need and cannot afford the luxury of such service, then I say by all means let the state assist as long as it may be necessary until public awakening has reached the point that no further state assistance will be required.

In closing may I say one more word regarding possible state or

*Since the presentation of this paper, New York State has accepted the provisions of the Sheppard-Towner Bill.

federal assistance. There are many objections, particularly to federal assistance, but of this I am certain that at the present date, every effort is being made both by the states and the Federal Bureau in Washington to allow the medical profession to actively assist in the administration of its program. A serious handicap, however, is to be found in the fact that the average physician finds himself so hampered for lack of time, that his efforts all too frequently are of little avail.

162 EAST SEVENTY-FIRST STREET.

(For discussion see p. 351.)

CONTROL OF MIDWIVES*

BY HAROLD BAILEY, M.D., NEW YORK, N. Y.

THE midwife problem has been frequently discussed during the last fifteen years and as a result some effect has been made in the control and restraint of these practitioners. Perhaps the greatest advance was made in England by the creation of the so-called Central Midwives Board. This governing body first came into control by an act of Parliament in 1907. At the beginning its authority was confined to England alone, but recently it has been extended to include Scotland and Wales. It is interesting to note that the Board was created for the purpose of "regulating, supervising and registering within due limits the practice of midwives." While the women who were already engaged in this pursuit were allowed to continue under the years of practice regulation, the new applicants are obliged to have two forms of training. First, they must be registered as nurses—following a regular course of training; and second—they are required to take a four months course in midwifery in which they, personally, deliver twenty women and attend a total of forty. Those who complete this training receive the title C. M. B. which means that they are registered by the Midwives Board. At first only a few nurses took the course but, at the present time, a very large number, probably in the neighborhood of 75 per cent, take this additional training. As each hospital with obstetrical connections was opened under the law for the teaching of these women, it became necessary to have the training, if one wished either to return to the hospital as a nurse or as a teacher, in any of the various training schools.

It is unquestionable that this regulation has greatly improved the condition in Great Britain by raising the standard and by providing close control of the women who act in this capacity. In France and

*Read at a meeting of the New York Obstetrical Society, March 13, 1923.

Germany, for many years, midwives have had considerable training and have been under medical control.

The conditions in this country, for a long period, have been disgraceful, due partly to our attitude toward the situation and partly to the fact that these women are uneducated and untrained. In some areas their right to practice is denied and leaders of the profession who fully realize that it is impossible for the medical fraternity to handle all the obstetrical cases, nevertheless refuse to admit that these women should practice in a semi-medical capacity. This attitude has led to a surreptitious and unlawful practice on the part of the midwives. The midwife has felt that she was *persona non grata* with the doctor and has not uncommonly been insulted by him in any conference in which it was necessary that they come together. As a matter of fact the blame is all too readily placed on the midwife for the obstetrical difficulties that ensue in the course of abnormal labor. This has resulted in a condition of fear among these women, so great in extent that rather than consult a doctor in an emergency and possibly be charged with negligence or threatened with the revocation of their licenses, they allow the faulty conditions to drag along until life is endangered.

There are, however, some communities, even entire states, as a matter of fact, that fail to have any law for the control of these practitioners, or if they have such a law it has become a dead letter. It has been said that in Mississippi there are 5,000 midwives practicing illegally some of whom are black and white males. A personal desire to do so is the only requisite necessary to practice.

In New York in 1911 through the influence and personal energy of Dr. John W. Brannan, the Bellevue School for Midwives was started as a teaching institution. It is now the only institution for teaching midwives in this country. Previous to its foundation the schools existing were mere diploma factories. This school received a great deal of criticism and obstruction in its progress and only in the last few years has it received the proper recognition. However the City Health Board has been in harmony with the idea and it has refused to admit to practice any woman who is not a graduate of the School or of a similar school abroad. This stand has had a very decided result on the practice of midwifery in this city. The number of midwives has been reduced one-half so that now only 1500 are registered. The deliveries have been reduced from one-third to one-fourth of the entire number of parturient. Their handling of normal cases of labor has been conducted with fewer deaths of the mothers from sepsis and with as low a number of stillbirths and eye infections of the babies as in the cases handled by the medical profession. Crim-

inal abortion has diminished and a very small number of midwives have been charged with this or other misdemeanor.

A different method of control originated by the Bureau of Medical Education and Licensure, has been in vogue since 1913 in the state of Pennsylvania. The practical application of these regulations in Philadelphia is described by Nicholson. The plan requires the reporting of the midwives to an inspector within forty-eight hours after delivery and provides for the inspection by a medical officer of every baby and mother within the first few days. The local inspector is required to go as consultant when called upon by a midwife or, for abnormal conditions, she may call a private physician provided the patient can pay the fee. Lectures are given by the inspectors during the winter although the attendance is not compulsory; and twice during the year there is an inspection of the equipment of the midwives. In Philadelphia, as in New York City, a license can be revoked only for reasons that may be sustained in a court of law. In New York State, exclusive of New York City, the Legislature has given the Commissioner of Health the power to revoke licenses upon reasons that are satisfactory to him.

The question arises as to the proper qualifications for admission to this important practice and also as to the requirements for training. Are we able to train these women in a way to make their practice safe? After they have satisfactorily completed their training how are we going to hold them to the standards that they have been taught? It is possible that these questions can be satisfactorily answered.

Through the course of twelve years in our midwives' school, we have graduated 410 women. In the early part of this period the preliminary training was deficient, but by degrees the admission requirements were increased until now we have women of an intelligent grade. This year, of those who entered the School, ten were Americans, nineteen Italians and fourteen belonged to the German or Slav races. The graduates have formed an alumnae association which they manage themselves and which is semiscientific in nature. Of course, the more intelligent the woman is at the time that she enters the school the greater will be her value later. If we could do as the English have—that is train the nurses to act in this capacity—it would be one step forward but the peculiar conditions in America preclude the possibility of our nurses doing this kind of work in the tenements, because most of the women who wish midwives' services are foreigners who do not speak English and wish household aid as well as maternity care. An argument might be advanced for the employment of nurses in the sparsely settled regions of the country.

There is no doubt that the prenatal nurse employed by municipalities

should be trained as a midwife. One of her chief duties in the outlying districts is to aid in the instruction and control of those who are so licensed and the nurse is hardly fitted to do this unless she has an equivalent education. If in general practice we must select for students women who are untrained in nursing we should at least demand as an entrance requirement, a grammar school education.

How are we to train these women so that their practice will be safe? Our chief aim has been to train the women in aseptic technique. In order to provide sufficient practical instruction we have gradually lengthened the course until now it is of nine months' duration. For eight months the women serve in the indoor and outdoor departments and they are required to deliver twenty cases and to attend to at least seventy-five or eighty more.

In the School, under the charge of the resident doctor the women examine the patients in the prenatal and postnatal clinics and they receive a very thorough training in this type of work. They are permitted to make vaginal examinations on the antepartum women and to acquaint themselves with the outlines of the pelvis. The patient, however, is measured and placed in the normal or abnormal class by the resident surgeon. In the care of labor these midwives wear no gloves. They are taught to scrub their hands for ten minutes as it was considered that a soap and water sterilization would be more satisfactory than a constant putting on and off of rubber gloves. I personally believe the women should not only wash their hands thoroughly but they should be required to wear sterile rubber gloves. They are permitted to make one vaginal examination during the course of labor. The importance of the abdominal examination in obtaining knowledge of the presentation and position of the fetus is emphasized so that labor can be conducted with as great a facility from the abdominal examination as with the added vaginal.

The limited training of these women does not allow them to acquire much information from a vaginal examination. It must be recalled that in cases of delayed labor where the examination becomes necessary the infant's head is molded, distorted and edematous so that a mere touch examination would furnish very little information even to an expert. Rectal examination is not permitted because of the danger of breaking the aseptic technique and also because of real injury to the patient. Injury of the rectum may result or infection may occur through pushing the vaginal wall, in front of the examining finger, into the open cervix. From a study of the subject I am convinced that vaginal and rectal examinations should not be made by midwives.

We conduct our own service at Bellevue without permitting anyone to examine a case by rectum or vagina unless there is delayed

or complicated labor. We have been able in almost every instance, as is of course well known, to make a proper diagnosis and prognosis of labor. If we, as obstetricians, hesitate to examine the patient by vagina, why should we permit the midwives to do so? Probably by an examination no midwife would be able to help a woman in any way whatsoever. At once arises the question of failure to detect a prolapsed cord but prolapse of the cord occurs only about one in 250 labors and usually the prolapse occurs in deformed pelvis or in other abnormalities of position which would place the case at once in the hands of the doctor rather than the midwife. And, again, our experience has been that these cords prolapse through artificial and accidental rupture of the membranes by the examining finger, when the head is unengaged.

We believe that our methods of controlling these women while they are students at the school is ideal in every respect except that examinations are permitted. As an example of our results, we delivered 956 women in 1922 with no maternal deaths or infections and the stillbirths and neonatal deaths together were thirty-five per 1000 births. We have had even lower stillbirth rates in other years. Practically every mother nurses her infant and we know that this method is continued at home for the cases are followed for a period of six weeks.

MUNICIPAL CONTROL

The control of the midwives should be in the hands of local health boards. The supervision should be as close as the requirements in the School for Midwives. The women should be aided in the selection of their cases and they should not be permitted to deliver primiparæ. Inspectors furnished by the city or community should follow up cases of delayed labor. Of course any such arrangement calls for a considerable amount of money but when we recall the infant mortality of the first month which including stillbirths is close to eight or ten per cent at the present time, why should not a municipality that spends millions for education spend a little for the preservation of life? A number of obstetricians must act as local inspectors and they must be men of the highest standards who have been selected through civil service examinations. They should be in charge of the health board maternity centers located possibly in infant feeding stations or maternity hospitals in the district. The health board at the present time lists forty-nine of these stations. Maternity nurses with a midwife's training should be used to follow up the cases and every parturient should be seen on the day of or the day after delivery, and an accurate report secured. This report should be made by the midwife on suitable blanks that are provided for the purpose.

Prenatal and Postnatal Clinics.—The midwife should be required by law to bring every patient to the health board's obstetrical prenatal clinic for the obstetrician in charge of the district to make a prenatal examination and prognosis of pregnancy and labor. The normal cases (and these should be only multiparae) are returned to the midwife for her care. But the primiparae and the abnormal cases should be referred to the hospital for care either on the indoor or outdoor service, unless the patient prefers to have a private doctor. During the prenatal period, if the midwife finds abnormal symptoms developing she should be required to report to the inspector for advice. During the labor period if twenty-four hours pass without delivery no matter what the diagnosis of fetal position, the case should be reported by the midwife to the inspector. The regulations should prohibit vaginal and rectal examinations. Every woman delivered by a midwife must be brought to a postnatal clinic for discharge so that the lacerations and malpositions may be diagnosed and proper advice given for future treatment. The health commissioner should have the power (as he does now in the State of New York, exclusive of New York City) to revoke the license of a midwife for infraction of any rule. Such regulations for midwives will be a great aid to the community where her work will be safely conducted for she will no longer be a pariah but a valuable member of society.

SUMMARY

The standard for admission to the training school should be high and nurses should be permitted to take the course if they intend to practice maternity work in public health positions. The practical training should consist in attendance at one hundred cases of confinement. The midwife should not be permitted to take primiparous women and she should be required to present all cases for a prenatal examination so that a proper diagnosis of pregnancy and labor may be made by a medical consultant. Vaginal and rectal examinations should be prohibited. All women in labor for 24 hours without delivery should be considered as abnormal cases. Consultation with a private physician or medical inspector should follow the deliveries conducted by midwives.

THE TREATMENT OF PELVIC INFECTIONS IN WOMEN*

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SERIOUS attempts to solve the problems met with in treating inflammatory conditions in the female pelvis date back only about one hundred years. During this time improvements in the treatment have been made possible by refinement in instruments and diagnostic methods, ability to control hemorrhage and the introduction of general anesthesia. The greatest advance has come with the understanding of the pathology of the disease and the study of infections and immunity.

What may be called the modern treatment of these inflammatory conditions is dependent on our present knowledge of the behavior of infections and immunity. That such knowledge is either not universally understood or is not accepted is shown by numerous articles written in the past few years advocating exactly opposite treatments for the same condition. Every large gynecological service constantly has admitted to its wards as patients, women who have been mutilated or made invalids for life by ill-advised operations performed by men either grossly ignorant or hopelessly dogmatic in their ideas. Therefore, it should be our aim to arrive at a safe and sane common ground in an endeavor to standardize the treatment of these common conditions.

For the sake of simplicity in discussion and treatment the infections will be considered under three headings: 1. Puerperal, including postpartal and postabortal. 2. Nonpuerperal, chief of which is the gonorrheal. 3. Tuberculous. This will cover most of the infections caused by the organisms usually encountered; namely, the gonococcus, streptococcus, staphylococcus aureus and albus and the colon and tubercle bacillus. The occasional case having as its etiological factor an inflamed appendix or diverticulum or a necrotic fibroid or twisted pedicle tumor is usually properly treated when diagnosed.

Before treatment is instituted a diagnosis of the probable etiology should be made. A careful history and a study of the situation and character of the local condition will usually reveal this. The puerperal thickening usually involves the parametrium, is hard and bleeds into uterus while the gonorrheal usually involves the tubes, is higher up, softer and more discrete.

*Read at a meeting of the Section of Obstetrics and Gynecology, New York Academy of Medicine, April 24, 1923.

PUERPERAL

Puerperal pelvic infections are primarily wound infections. The wounds may be in the vagina, cervix or endometrium. The infection having entered by whatever portal, advances more usually by way of the lymphatics. Unless the infection is too virulent and rapid, an exudate is thrown up by Nature in its attempt to stop the advance. Parametritis is therefore a frequent and favorable finding in these cases. If the infection starts from an infected endometrium or infected placental tissue it may spread through the uterine wall giving a lymphangitis or metritis. If it reaches the peritoneal surface a perimetritis or pelvic peritonitis is set up which may involve ovaries and tubes by contiguity. A pelvic exudate may form which may be able to stop the advance with spontaneous recovery or localization into a pelvic abscess. If the advance is not stopped, the peritonitis may become generalized. If the organism is very virulent it may advance so rapidly that the body does not have time to throw out its exudate and we may get a fulminating peritonitis or a general blood stream infection or bacteriemia. Less often the infection may extend from thrombi at the placental site along the venous route and give rise to a septic thrombo-phlebitis.

The basis of the modern treatment of puerperal pelvic infections is founded on the knowledge that these infections are, for the most part, general in character and that recovery is essentially by general systemic immunization against the infection. The local inflammatory exudate is not destructive in nature but conserving and protective. The relative part taken by the local and the general immunizing elements we do not know but the fact that some cases with no palpable local condition do recover would tend to show that in these cases immunization was mostly general.

The usual prophylactic measures which are familiar to all it is needless to recall to you. Let the patient approach labor in the best physical condition possible and with a sane, confident mental attitude toward the labor. Do not allow her physical and nervous reserve to be used up by a tedious and exhausting labor. At labor carefully observe the placenta so that you may know whether the uterus is empty should trouble later develop.

The real treatment of puerperal pelvic infections resolves itself into securing *proper drainage* and *constructive, supportive, constitutional measures* that will conserve and increase the immunizing forces of the body.

Drainage is secured by a high Fowler position with the patient lying on the abdomen at frequent intervals to prevent the posterior cupping of the uterus. Increasing the tone of the uterus further promotes drainage. The intermittent use of an ice cap over the fundus

and uterine tonic of ergot, quinine and strychnine every four hours helps to maintain the tone. This may be preceded by an initial dose of pituitrin if the case is seen early and the fundus is very boggy.

Constitutionally, fresh air and sunshine are priceless measures to be employed as in tuberculosis. This cannot be too strongly emphasized. Force water and nourishing liquid diet to the limit of assimilation. If there be nausea utilize the rectum. If there be diarrhea use frequent hypodermoclyses. Control excessive temperature by sponging and an ice cap; chills by hot blankets and water bottles. Secure rest and sleep by opiates if necessary. Restlessness, anxiety, fear and pain detract greatly, while a cheerful mental attitude is an important asset. Do not use irritating cathartics but secure elimination by enemata. A cheerful, conscientious nurse is invaluable in carrying out these details.

A patient admitted to the hospital and seen for the first time should receive careful observation and study in order to know the type and extent of the infection and the resistance of the patient. A complete blood count and blood culture are taken. Blood counts should be repeated whenever there is any change in the patient so that we may know better what is going on. One careful, gentle pelvic examination is made at which information as to the entire local condition is obtained and uterine culture taken if indicated. If there is hemorrhage it may be necessary to explore the uterus digitally, and if placental tissue is felt to remove it with placental forceps. If this is done the interior of the uterus should be swabbed with iodine. Iodoform gauze to stimulate contraction may be left in for 24 hours if the relaxed condition of the uterus so indicates. Some men would similarly explore the uterus whenever a foul endometritis is found. In an occasional case, in experienced hands, this might be advised but we feel that it is a dangerous tendency and generally practiced. more harm than good would be done and more lives lost than saved. Most of the worst types of infection seen have had some such manipulation by the outside doctor before the patient has come into the hospital. A sharp curet should never be used; to do so is criminal.

Parametritis or other pelvic exudate is let entirely alone and treated conservatively as stated above. The majority of them will clear up spontaneously. A small percentage will form an abscess, which usually points in the culdesac. This should be opened by posterior colpotomy but not until pointing is distinct. This is drained with rubber tube and iodoform gauze to either side of it or Bovee's parafinestearine gauze may be used. The cavity should not be irrigated and the tube should not be removed too soon. Any exudate persisting after the acuteness is past and the temperature has re-

mained normal will clear up more quickly by the exhibition of heat in the form of baking and hot donches followed by glycerine tampons.

In pelvic peritonitis endeavor by rest and posture to localize the condition. If it localizes and goes to abscess formation drain by posterior colpotomy as above. If it will not localize but is spreading to the general peritoneum, posterior incision and drainage may help.

General peritonitis is a fight between infection and immunity. The constitutional supportive treatment aided by hypodermoclyses and stimulation may turn the tide. The very virulent, fulminating type usually dies no matter what is done. In the less virulent types results are about equal whether treated surgically or conservatively. The same may be said of septic thrombophlebitis.

In bacteriemia we have to depend on the immunizing forces of the body to overcome the bacteria. Careful nursing and attention to detail in the constitutional treatment outlined above, is our main reliance. Vaccines do not seem to aid. Some men think that large doses of serum of the polyvalent type are of benefit. In severe types with low hemoglobin, repeated transfusions as advised by Polak may be used with benefit.

CHART I. ADMISSIONS

YEAR	TOTAL	PUERPERAL INFECTIONS	NON-PUERPERAL INFECTIONS	ABORTIONS	TOTAL MORTALITY
1920	1773	70	294	442	34 (1.9 per cent)
1921	2091	89	312	601	32 (1.5 per cent)
1922	2039	64	290	608	32 (1.5 per cent)
Total	5903	223	896	1651	98 (1.6 per cent)

CHART II. PUERPERAL, INCLUDING ALL TYPES OF POST-ABORTAL AND POST PARTAL INFECTIONS

YEAR	NO. CASES ADMITTED	DEATHS	MORTALITY
1920	70	22	31.4 per cent
1921	89	16	18 per cent
1922	64	12	18.7 per cent
Total	223	50	22.8 per cent

During the past three years there have been admitted to the Gynecological Service in Bellevue Hospital, 223 cases of postabortal and postpartal infections. (Chart I.) This includes all cases of parametritis, peritonitis and bacteriemia. A number of cases were moribund on admission and survived less than twenty-four hours. Of the total 223 cases, 23 developed pelvic abscesses which were treated by posterior incision and drainage, without mortality. This gives an incidence of approximately 10 per cent. Fifty deaths give a total mortality of 22.8 per cent. The decrease from 31.4 per cent in 1920 to 18 per cent for 1921 and 1922 is worthy of note. (Chart II.) We think this is due to the fact that the entire staff is greatly interested

in these cases and they are studied more carefully and greater attention is given to the detail of carrying out the hygienic treatment.

GONORRHEAL

Gonococcus infection differs from puerperal infection in that it is essentially a mucous membrane infection and usually spreads by continuity of surface. As the infection reaches the fimbriated ends of the tubes, a perimetritis or local pelvic peritonitis is more often found, rather than a parametritis. However, in cases of endocervicitis, there is frequently found a varying amount of cellular infiltration of the utero-sacral ligaments and many cases develop a metritis.

Treatment of these cases will be divided into the acute and chronic groups. The subacute type is treated similarly to the acute.

Acute gonorrheal pelvic infections should never be treated surgically. Absolute rest in bed is the greatest essential. If there is evidence of peritoneal involvement the Fowler position should be utilized to aid in localizing the condition. Give a nourishing liquid diet and water freely by mouth. Pain is controlled by an ice-cap to the abdomen and salicylates and codeine. Cathartics are harmful and increase and prolong the symptoms. Mineral oil and small doses of milk of magnesia three times a day work well and enemas will not often be required. No local treatment is used while the condition is acute. It is astonishing how quickly the temperature and pain will subside if the treatment is rigidly carried out. Occasionally, we encounter a case where the pain and temperature persist. This usually means a mixed infection and treatment is prolonged. It is in this type of case that a pelvic abscess sometimes develops, from the localization of a pelvic peritonitis. When it is well developed it should be opened and drained by posterior colpotomy. Utilization of non-specific protein injections in acute cases may be tried. Gellhorn reports encouraging results from the use of sterile milk injections in acute and subacute cases.

Conservative treatment is continued until the condition is no longer acute and the blood count is normal. When the temperature has remained normal for one to two weeks and the patient is free of symptoms she is given a trial out of bed. As long as she continues so she is allowed to slowly resume her duties, being advised regarding coitus and bowel hygiene. She is instructed to use hot douches and is kept under observation. A good percentage will clear up and remain so, others will have exacerbations, usually due to failure to follow instructions.

Under chronic gonorrheal infections we include all cases having any residue of pathology after the primary acute attack has subsided.

The amount of pathology in different patients varies widely. There may be only an uncomplicated mild salpingitis or there may be extensive involvement of the entire pelvic viscera. The symptoms vary just as widely. There are all degrees from simple sterility to chronic invalidism.

The treatment of the chronic condition will depend on the symptoms, the social condition and the mentality of the patient. Nearly every case, after the first attack, is given an opportunity to carry on her usual routine. Mild cases with slight pathology who are in a position to carry out treatment may never require surgical interference. Cases with pronounced pathology or those with low mentality who cannot be taught hygienic living or those having to work hard for a living will be treated best by surgery. A very young patient whose fundus is in good position is often allowed to have two or three trials of conservative treatment before operation is decided on.

Surgical treatment having been decided upon, operation should not be done until the postulates as laid down by Simpson have been fulfilled. He has conclusively shown us that the mortality and morbidity will be materially lessened by following these guides. At this stage it is easier to distinguish between healthy and diseased tissue and rational conservative surgery can be carried out. Before this we are handicapped by having friable tissue to deal with. In consequence, careful peritonealization is often impossible and adhesions form which may give worse symptoms than the original disease.

At the time of operation what is to be done will depend on the pathology found and on the age and social condition of the patient. Our aim should be to remove the diseased tissue and yet preserve ovulation, menstruation and the reproductive function. Seldom can all these be done. While it is impossible to consider every contingency some guiding principles may be offered.

Possible sources of reinfection in the vagina should be cleared up by cautery or excision before laparotomy is begun.

A pronounced Trendelenburg position before the abdomen is opened makes operation easier, abdominal pads will seldom be required except to catch a doubtful spill and less trauma to the intestines will result.

All diseased or very doubtful tissue should be removed unless the patient has insisted that she would risk another operation for the sake of preserving some organ.

If only the tubes have to be removed, care should be taken not to interfere with the ovarian circulation.

If the ovaries are good and both tubes and uterus diseased, a partial hysterectomy of the Bell-Beutner type may be done.

If both tubes and both ovaries have to be sacrificed then the uterus, especially if it has much raw surface, should usually be excised. If the cervix is also diseased a complete hysterectomy should be done.

Where the uterus and one or both ovaries are left in, a prophylactic suspension of the uterus should be performed.

In very young women a doubtful ovary may be left in for the sake of preserving menstruation and internal secretion whereas in a woman near the menopause the same type of ovary would be removed.

Care should be taken, wherever possible, to peritonealize all raw surfaces.

TUBERCULOUS

Tuberculous involvement of the pelvic organs is most common in the tubes as an endosalpingitis or a perisalpingitis, the lesions being practically always bilateral. The uterus is next in frequency, especially the endometrium which seems rather susceptible to the tubercle bacillus. The ovaries are least often involved and are then usually secondarily infected from the tubes or peritoneum.

Pelvic tuberculosis is usually secondary to an infection in some other part of the body. The peritoneum is involved in about 60 per cent of cases that have tuberculosis of the pelvic organs. The infection is usually either a descending one or is hematogenous in origin. Many cases are associated with positive chest findings while others may have had chest lesions that have since healed so that it would appear as if the primary lesion was in the pelvis or the peritoneum. R. Peterson in a careful review of 100 cases of pelvic tuberculosis found positive chest signs in 25 per cent of the cases. In 44 of his cases in which total ablation was done, the tubes were involved in 86 per cent, the peritoneum in 66 per cent, the uterus in 50 per cent and the ovaries in 43 per cent.

The diagnosis of tuberculosis of the pelvis, uncomplicated, is not generally made before operation as the symptomatology is not unlike that of chronic adnexal disease of gonorrheal origin. If there is a tuberculous lesion elsewhere in the body or the patient is an undoubted virgin with intact hymen and has pelvic symptoms and adnexal pathology we would suspect the tuberculous nature of this pathology. Where the tuberculosis of the pelvis is associated with tuberculous peritonitis the diagnosis is not so hazardous. In this latter condition, however, we must differentiate between tuberculosis and malignancy. Many cases are first diagnosed or suspected at operation but the report from a careful laboratory study of specimen removed should be accepted as to the positive tuberculous origin of the disease.

Treatment: If a tuberculous pelvic infection is diagnosed or suspected a careful examination of the patient should be made to ascer-

tain whether there is any other lesion in the body. If so, consider the relative bearing of the lesions on the symptoms. Will the other lesion be made worse if the pelvic condition is treated surgically? General miliary or advanced pulmonary tuberculosis will certainly be made worse by operation. The hygienic treatment of rest, food, fresh air and sunshine will benefit and should be used in all cases whether it is the only treatment or a trial treatment while the patient is under observation or a convalescent treatment of a patient who has been treated surgically. In a case associated with tuberculous peritonitis, hygienic treatment may be tried as long as there is improvement as a fair proportion of these will subside spontaneously. Early cases with ascites deserve such a trial. If pressure becomes embarrassing, paracentesis, though it has a slight element of danger to an adherent gut, may be tried, especially if the general condition contraindicates an exploratory laparotomy. The routine treatment of opening and letting in the sunshine while still used has not the undisputed vogue it formerly had.

When operation is deemed advisable either originally or after conservative and hygienic treatment has been tried and justifiable symptoms persist it is done as in any other chronic pelvic infection except that we are inclined to be more radical and not leave any focus of infection. As the uterus is involved in 50 per cent of cases, hysterectomy is done in a larger percentage of cases than in chronic gonorrheal infections. Bilateral salpingectomy is practically always indicated and the doubtful ovaries cannot be spared. Intestinal involvement is best let alone, as the majority of cases improve after the pelvic disease is removed. Any injury to the intestines during operation is very likely to cause fecal fistula which usually resists every effort to cure. For the same reason a drain should never be inserted if it can possibly be avoided.

CHART III

	ACUTE AND CHRONIC CASES	CASES OPERATED	ONE OVARY ONLY SAVED	UTERUS ONLY SAVED	TOTAL ABLATION	UTERUS AND ONE OVARY SAVED	UTERUS AND TWO OVARIES SAVED	CERVIX AMPUTATED	PLASTIC	APPENDECTOMY	UTERUS SUSPENDED	DEATHS	MORTALITY
1920	294	100	4	2	27	47	20	30	23	47	55	3	3 %
1921	312	114	9	8	39	41	16	29	14	74	52	3	2.6 %
1922	290	97	3	4	24	52	3	24	17	45	49	1	1.03 %
Total	896	311	16	14	100	140	39	83	54	166	156	7	2.2 %

In the past three years 896 cases of nonpuerperal pelvic infection have been treated on the Bellevue Gynecological Service. Of this number approximately two-thirds were chronic infections. A total

of 311 cases, mostly chronic, were subjected to operation after they were found to meet the conditions stated above. This gives an operative incidence of about 50 per cent in the chronic cases. With seven deaths there was an operative mortality of 2.2 per cent. Total ablation was done in 100 cases. Ovulation was preserved in 195 cases. One hundred seventy-nine (57 per cent) had ovulation and menstruation preserved, while a good percentage of these will be able to bear children. Endeavor was made to remove or repair all pathology giving symptoms. So it will be seen that plastic repair was done on 54 patients and 83 had a modified Sturmdorf amputation of the cervix. Patients having symptoms caused only by endocervicitis seldom require operation. Most of these can be cured by treatment with the electric cautery in the manner advocated by Dr. Holden. Some form of suspension was used in 156 (80 per cent) of the 195 cases having the uterus preserved. Appendectomy, most frequently prophylactic, was performed 156 times. The decrease in the mortality from 3 per cent in 1920 to 1.03 per cent in 1922 we believe is due to the realization and practice of the principles of treatment outlined in this paper.

CONCLUSIONS

1. In treating puerperal pelvic infections our aim should be to secure proper drainage and to utilize all measures that will increase the general immunity of the body against the infection.

2. Surgery is limited to the control of hemorrhage and the evacuation of pus in frankly developed abscesses.

3. In acute nonpuerperal infections we should employ rest, posture and hygienic treatment to localize the infection and increase the general immunity against it.

4. Chronic infections that continue to produce sufficient symptoms should receive operative treatment.

5. Operation should not be done until all evidence of the acute disease has disappeared.

6. At operation, in our endeavor to cure the patient, we remove or repair all pathological tissue preserving, if possible, all the normal functions of the body.

REFERENCES

- Alexander, E. J.*: Texas State J. Med., Dec., 1919, xv, 287. *Anspach, B. M.*: International Clin., 1919, iii, 48. *Bovér, J. W.*: Surg., Gynec. and Obst., May, 1919, xxviii, 514. *Brettauer, J.*: Am. Jour. Obst., 1911, lxiv, 456. *Brown, J. Y.*: Jour. A. M. A., Aug. 10, 1918, lxxi, 423. *Clark, John G. and Norris, Charles C.*: Surg., Gynec. and Obst., July, 1917, xxv, 33. *Clark, S. M. D.*: New Orleans Med. and Surg. Jour., 1918, lxx, 782. *Cullen, T. S.*: Surg., Gynec. and Obst., August, 1917, xxv, 134. *Davis, E. P.*: Am. Jour. Obst., 1919, lxiv, 469. *Duncan, H. A.*: Am. Jour. Obst., 1918, lxxvii, 288. *Dubose, F. G.*: Surg. Gynec. and Obst., Sept., 1921, lxxiii, 299. *Findley, P.*: Wisconsin Med. Jour., 1916, xv, 116. *Gellhorn, G.*: Jour. Missouri Med. Assn., Aug., 1922, xix, 341. *Graves*: Gynaecology, 1917.

Ill, E. J.: Am. Jour. Obst., 1918, lxxviii, 11. *Kennedy, J. W.*: Am. Jour. Obst., 1918, lxxvii, 782. *Marxwell, A. F.*: Calif. State Jour. Med., Oct., 1920, xviii, 363. *Montgomery, E. E.*: Ther. Gaz., 1917, xli, 533. *Idem*: Ther. Gaz., 1917, xli, 609. *Peterson, R.*: Am. Jour. Obst. and Gyn., 1922, iv, 234. *Polak, J. O.*: Am. Jour. Obst., 1911, lxiv, 461. *Idem*: Am. Jour. Obst., 1918, lxxvii, 916. *Idem*: New York State Jour. Med., 1916, xvi, 344. *Watkins, T. J.*: Jour. Am. Med. Assn., 1916, lxvii, 1076. *Ward, Jr. G. G.*: Am. Jour. Obst., 1915, lxxi, 881. *Wilson, A. S.*: Med. Jour. South Africa, 1922, xvii, 112. *Wharton, L. E.*: Arch. Surg., 1921, ii, 246.

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(For discussion, see p. 356.)

PELVIC INFLAMMATIONS, THEIR ETIOLOGY AND PATHOLOGY*

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IN a general discussion of the etiology of pelvic inflammations, it is advisable to begin with a brief account of the bacterial flora that are normally found in the genital tract. This will help in explaining those rare instances of autoinfection that occur even under the most ideal of aseptic conditions. Investigations of the genital tract in the fetus have failed to show the presence of bacteria. Vahle¹ found that the vagina in the newborn was sterile during the first twenty-four hours of life, but that on and after the third day, he could always isolate strains of staphylococci and of streptococci. Stroganoff² has found bacteria on several occasions during the first few hours after the birth of the infant, and in a few rare cases, he has been able to demonstrate bacteria during the actual delivery of the infant. These latter instances consisted of breech deliveries. Other investigators have corroborated these bacteriological findings.

In the vagina of the adult, however, we are far from finding the same unanimity of opinion. Kroenig³ has been unable to find any pathogenic microorganisms, excluding the gonococci, in the adult vagina. Walthard⁴ made an intensive antepartum and postpartum bacteriological study of the genital tract in one hundred women. This investigator divides the tract into an upper noninfected portion consisting of the tubes, uterus and upper cervical canal, and into a lower infected portion consisting of vestibule, vagina and lower cervical canal. He has been able to isolate streptococci, staphylococci, bacillus coli communis and gonococci in the vaginal discharges. In twenty-seven per cent of his cases, he has been able to isolate the streptococcus. It is very important, however, to note that in testing out this organism, he found that it had lost its virulence. Inoculation of this strain into healthy animals gave negative results. Where,

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however, the vitality and resistance of the experimental animal were lowered either locally or generally, the inoculation of this same strain resulted in the production of abscesses, and in this manner the microorganisms regained all their former virulence. Burkhardt and Doederlein⁵ found streptococci in the vagina of four and of four and one-tenths per cent of their cases respectively. Bumm and Sigwart⁶ found them in as many as seventy-four per cent of their patients. Williams⁷ in one group found twenty per cent of streptococci, and in a later investigation did not find any streptococci at all. He explained these apparently inconsistent findings by a difference in the technic employed in the two series of cases, and proved to his satisfaction that in the positive instances, the organism had been introduced from the external tissues by means of the speculum.

As far as the uterus is concerned, all investigators are in accord that the healthy nongravid uterus is free from bacterial contamination. The puerperal uterus, however, again brings us on disputed ground. In a study of fifty normal patients in Williams' clinic, Little⁸ obtained the following results: Cultures taken immediately after the delivery of the placenta were found to be sterile in ninety-six per cent. Cultures taken on the third day postpartum were sterile in eighty-five per cent. Those taken on the ninth day were sterile in only seventy per cent. Stolz, Schieb, et al.,⁹ found streptococci in thirty and thirty-eight per cent of their normal patients. The findings of Foulerton and Bonney¹⁰ on the other hand were entirely negative along these lines.

In considering the problem of the diseased genital tract, it is necessary to study not only a large number of cases, but it is also essential to investigate the material of more than one clinic. The type of patient in one institution will often vary so very markedly from that in another, that a statistical study, especially of the etiological factors, will frequently show marked differences both in the type and degree of infection. Another factor towards which attention should be directed, is the frequent occurrence of sterile accumulations of pus making it impossible, from a bacteriological point of view, to determine the original infecting organism. Wertheim¹¹ in one hundred and sixteen cases of pus tubes, found sterile pus in seventy-two. Martin¹² had sixty-three sterile cases in one hundred and nine pus tubes. Liepmann¹³ found aerobic microorganisms in only thirty-two per cent of his patients. In a series of four hundred and ninety-one patients admitted to the Mount Sinai Hospital for nonpuerperal pelvic infections, bacteriological study showed the following pathogenic bacteria: Gonococci, 6 per cent; streptococci, $9\frac{1}{2}$ per cent; staphylococci, 3 per cent; tubercle bacilli, $5\frac{1}{2}$ per cent; other bacteria 3 per cent. Figures taken from four other clinics give the following statistics.

	Mt. Sinai Hos.	Andrews ¹⁵	Menge ¹⁶	Pankow ¹⁷	
Gonococci	6 %	43%	21%	23%	43%
Pyogenic	12½ "	24 "	4 "	3 "	22 "
Tubercle	5½ "	2 "	8 "	7 "	22 "

The variations in the figures can be explained first, by the differences in the types of patients, and secondly by the time of operation. It is well known that bacteria can be much more readily isolated from tissues and from pus obtained early in the course of inflammation. In the order of their frequency, we can say that the most important bacterial organisms found as etiological factors are the gonococci, the streptococcus and staphylococcus group, and the tubercle bacilli.

The duration of the life and hence of the virulence of the organism is of great practical importance insofar as the time of operation and the type of operation are concerned. The work of Curtis¹⁴ is extremely valuable, especially along these lines. He showed that the gonococcus cannot as a rule be isolated from the tubes two weeks or more after the cessation of fever and after the disappearance of the leucocytosis. The streptococcus, however, he found could be isolated in its virulent form months and in some instances years after all clinical evidence of infection had disappeared. The tubercle bacillus is of course always to be considered as a source of constant danger. The method of treatment, therefore, must be decided upon both regarding time and type by a due consideration of the organism involved.

Before describing the pathological changes, it is advisable to say a few words regarding the paths of infection that the various organisms generally select. This is especially important because, although the bacteria in most cases select a path that is characteristic for that type, the changes proper are due not so much to the micro-organism as they are to the tissues involved. It is this which makes it impossible in a small minority of instances to recognize the type of bacterium responsible for the inflammatory changes. In most cases, however, one can readily tell from the nature of the pathological changes both macroscopically and microscopically, what the causative factor is.

The most common path of infection is that taken by the gonococcus. This consists of a direct passage along the mucous membrane of the genital tract beginning from below and ascending through the cervix, uterus, tubes and peritoneum. In this type the changes are found most marked along the mucous membrane of the organs involved. Here we have as characteristic changes endocervicitis, endometritis and endosalpingitis. The next most common path is that taken by the streptococcus group. Here the organism travels not

only along the mucous membrane but also through the lymphatic system and as a result the changes are found to be much deeper and to consist mostly of inflammation of the wall proper of the organ involved. The third or hematogenous path is occasionally taken by the streptococcus group in pyemic cases where the pelvis may become the site of a metastatic process. It is much more usually taken by the tubercle bacillus. The fourth or descending path is that which occurs when the infection travels from the abdominal cavity downwards through the tube. The most common instances are the spread of inflammation from a diseased appendix to the right adnexa and the development of adnexal tuberculosis from a tuberculous peritonitis. In this method the changes are mostly perisalpingeal and periuterine.

Macroscopic Findings.—In the acute stage the tube is hyperemic and thickened. The thickening will be found to occur more in the serosa or in the mucosa depending upon the path that the infection has pursued. When the tubes are open, the fimbria are seen red, erect and edematous. The tubal contents may be serous, sanguineous, caseous or purulent. The fimbriated extremity is often found closed with a resulting formation of a hydrosalpinx, pyosalpinx, etc. Discrete nodules are occasionally met with in the isthmic portion of the fallopian tube. These structures are formed by localized hyperplasia of the endosalpigium, the so-called salpingitis nodosa, or by small intramural abscesses. The peritoneal surface will in some instances of tuberculosis present small pin head sized grayish yellow opaque tubercles that are slightly elevated above the surface of the peritoneum.

The adhesions present rather distinct clinical characteristics. In the gonorrheal infections, they can be very readily separated by finger or by blunt dissection. Where sharp dissection is required, it is generally to be found that the gonorrheal infection had been complicated by some other pyogenic organism. In the tuberculous and in the pyogenic infections, the adhesions are very much different. They are dense, firm and more extensive. In their separation sharp cutting dissection is required. The intestines, adnexa and uterus are often firmly matted together, and in the process of separation, periovarian and periuterine abscesses are not infrequently opened. Where the process has lasted for some time, it frequently is noted that the inflamed tube and ovary had fused, and that the adjacent surfaces had become absorbed with the resulting formation of a single tuboovarian cyst or abscess depending upon the nature of the enclosed fluid.

Microscopic Findings.—According to Schridde,¹⁵ in very early cases of gonorrhea, the tubal inflammation begins as an endosalpingitis. The mucosa is hyperemic and there is definite desquamation of the

epithelium. The tubal secretion contains polynuclear leucocytes and some lymphocytes and a few plasma cells. Gonococci can be demonstrated in the epithelium. In the later stages, the tubal folds are hyperemic, thickened and densely infiltrated with lymphocytes and plasma cells. When the desquamated areas of epithelium in the tubal folds come in contact with other desquamated areas, agglutination occurs and subsequently firm intratubal adhesions. As a result of the inflammatory stimulus, the epithelium at times proliferates profusely. When the edema recedes, the agglutination of the folds persists and in this way glandlike spaces and pockets are formed, producing a sort of tubal labyrinth. Schridde emphasizes the presence of the plasma cell not only in the tubal secretion but also in the wall of the tube proper.

This same author differentiates histologically, the gonorrheal tube from the streptococcus one. He describes two varieties of the latter. (1) Endosalpingitis purulenta where the tubal secretion contains pus rich in leucocytes and poor in lymphocytes and in plasma cells. Streptococci are found in the pus and not in the epithelium. The lymph vessels are free. (2) Lymphangitis purulenta. In this type the lymph vessels are filled with pus and contain streptococci. From these infected spaces, mural abscesses develop. Schridde also claims that agglutination of the epithelial folds is the exception in streptococcus salpingitis. Other pathologists maintain that histologically, there are no differentiating factors between the gonorrheal tube and the streptococcus tube. They claim that plasma cells, epithelial desquamation, and agglutination of the tubal folds do occur in these tubes just as they do in the gonorrheal tubes. In respect to these differences of opinion, Wolff¹⁶ wisely emphasizes the importance that the path taken by the infection bears to the histological picture. In passing, I wish to call attention to the fact that, where the inflammatory processes have been of mild character, it is possible for a complete restitution to the normal to occur.

Oophoritis is usually part of a generalized pelvic inflammation, and has the same etiological factors bearing upon it. In rare instances, inflammation of the ovary may occur as an isolated pelvic condition, complicating pyemia or one of the acute infectious diseases—especially mumps. In these cases, the infection is a hematogenous one.

The appearance of an inflamed ovary depends entirely upon what portion of the organ is involved. The inflammation may be almost completely periovarian in nature. In this case, the ovary will be adherent to the neighboring structures and the adhesions will have the same characteristics as those of the tube, depending upon the variety of infection present. During the separation of the adhesions, small periovarian abscesses may be opened. Where the inner portion

is involved, the changes will be much more marked in the interior of the organ. The ovary will be soft, edematous and enlarged as a result of the hyperemic and exudative processes. The latter may be serous or purulent in character. When purulent, the ovary will be found to be the seat of an abscess. The course of an ovarian abscess is, in a way, similar to that occurring in the tube. It may become fused with the tube and form a tuboovarian abscess. It may perforate into the peritoneal cavity and produce general peritonitis. It may rupture into the vagina or rectum and empty itself in this manner. In other instances, it may produce septicemia with all the characteristics of that disease. In others, the abscess may become sterile and quiescent.

The tuberculous ovary does not differ materially in its pathological changes or in its course from a tuberculous tube of which it is generally an accompaniment.

There is another variety of pelvic inflammation that can be placed under the generic term of pelvic cellulitis. This consists of an inflammation of the connective tissue of the pelvis. The point of entry of the offending organism, which is in most cases the streptococcus, is usually a cervical laceration that is produced by instrumentation or by injuries following normal labor or interrupted pregnancy. The lymph spaces are invaded and the inflammation spreads through the lymphatics into the adjacent cellular tissue. The degree of involvement varies from a small localized unilateral inflammation to one that fills the entire pelvis. The conformation that is assumed by the inflammatory process depends upon the location of the inflammation and upon its extent. The pathological changes are the same here as they are in any other type of cellulitis. The tissues are extremely hyperemic and are infiltrated with round cells and with serous exudate. There is also a fibrinous exudate that gives to the tumefaction its typical hardness. Hardness and immobility characterize this type of inflammation.

The course pursued by the inflammation may lead to three different outcomes. The exudate even in extensive cases may undergo complete absorption and leave absolutely no trace. It may become almost completely resolved but leave a distinct scar in the pelvis, that results in a posterior parametritis, lateral parametritis, etc., depending upon the site of the original trouble. A third outcome is that in which the mass breaks down, usually in its very center, and is converted into an abscess. The abscess may be only the size of a walnut surrounded by a thick layer of exudate many times the diameter of the abscess, or the entire mass of exudate may be converted into one large abscess. The place of softening or in other words, that portion of the exudate which is first to undergo suppuration, bears an important relation to the method of treatment and determines whether the abscess is to be opened per vaginam or extraperitoneally above Poupart's ligament.

When the cellulitis is not a distinct entity, but is part of a generalized pelvic peritonitis or salpingitis, the ultimate outcome will depend not so much upon the cellulitis itself as it will upon the more important accompanying inflammation that may require treatment after the pelvic cellulitis itself had subsided.

CONCLUSIONS

In the order of their frequency, the organisms most commonly responsible for pelvic infections, are the gonococcus, streptococcus and staphylococcus, and tubercle bacillus.

The gonococcus lives but a very short time after the infection has become clinically arrested. The streptococcus, on the other hand, persists in its vitality for a considerable time after the clinical arrest of the inflammation.

The macroscopic picture, as represented on the operating table, allows a diagnosis to be made fairly readily in most instances.

REFERENCES

- (1) *Vahle*: Ztschr. f. Geb. u. Gyn., xxxii, Heft 3. v.
- (2) *Stroganoff*: Monatschr. f. Geb. u. Gyn., xi, p. 381.
- (3) *Kroenig*: Deutsch. med. Wehnschr., 1894, p. 819.
- (4) *Wilthard*: Arch. f. Gyn., xlviii, p. 201.
- (5) *Burkhardt, etc.*: Beit. z. Geb. u. Gynäk., 1889, ii, 2.
- (6) *Bumm*: Arch. f. Gynäk., 1912, xevii, 628.
- (7) *Williams*: Text Book on Obstetrics, p. 946.
- (8) *Little*: *ibid.*
- (9) *Stolz*: Bakt. d. Genitalkan. in d. Schwang. Graz, 1903.
- (10) *Foulderton*: Lancet, 1905, i, p. 915.
- (11) *Wertheim*: Arch. f. Gyn., xlii.
- (12) *Liepmann*: Handbuch. d. Frauenkrank., ii, p. 155.
- (13) *Martin*: Berl. klin. Wehnschr., 1893.
- (14) *Curtis*: Surg. Gynec. and Obst., 1918, xxvi, p. 178.
- (15) *Schridde*: Die Enzuend. des Eileiters, Jena, 1910.
- (16) *Andrews*: Amer. Jour. Obst., 1910, p. 596. Quoted by Gilmore.
- (17) *Menge*: Centralbl. f. Gyn., 1895, xix, 799.
- (18) *Kroenig*: Bakt. d. weib. Kanals, Leipzig, 1897, p. 264.
- (19) *Pankow*: La Semaine Med. Sept. 4, 1912. Quoted by de Bois.

20 WEST FIFTIETH STREET.

(For discussion, see p. 356.)

THE UTILITY OF DIGITAL DILATATION OF THE CERVIX*

BY PAUL T. HARPER, M.D., F.A.C.S., ALBANY, N. Y.

CHOICE of the above subject is prompted by a desire to present the peculiar advantages of digital dilatation in induction of labor and its early progress. It is, therefore, a first-stage procedure that is being considered; and the discussion has nothing to do with digital or manual dilatation practiced on the incompletely dilated but dilatable cervix preliminary to operative advance.

At the outset it is insisted that its field is limited, and that what follows is not written in advocacy of digital dilatation in uncomplicated cases as a means of instituting labor or of making its advance more rapid.

Cases in which haste in delivery is imperative or is at least highly desirable, are fairly common and practically all of them are met in advancing toxemia. Rarely the indications arise in accidental hemorrhage and still less often when a "heart" gives promise of bearing the strain of unassisted labor poorly. Emergencies of the kind are not new and accouchement forcé occupies a place in literature as a method of meeting them.

But extensive traumatisms were done to cervix and lower segment by Bossi dilators and by little less efficient fingers, and a procedure, the purpose of which was promising, fell into disrepute because of unfortunate accidents attendant upon carrying out dilatation that was forcible.

Use of the hydrostatic dilator makes forcible dilatation impossible because it depends for its efficiency upon contractions of the uterine musculature that are intermittent; but, for the latter reason, its action is relatively slow. Further, contractions depend upon presence of the dilator in position and, accordingly, progressively larger dilators may have to be inserted if maximum progress in dilatation is secured. It is in cervixes in which the internal os has undergone little obliteration that these effects are most pronounced and, unfortunately, it is in just such cases that maximum speed in dilatation is often desirable.

The foregoing are definite limitations of the hydrostatic dilator. There is one actual disadvantage attendant upon use of the "bag" and it is met when introduction is followed by maintenance of general uterine tone. Cervix and lower segment are especially affected by the foreign body in firm contact with them, and progressive dilatation is retarded until increased muscle tone has passed off. It is true that such uterine

*Read at a meeting of the New York Obstetrical Society, May 8, 1923.

overaction can on occasion be relieved by use of narcotics and anesthetics but it is apparent that the incidental delay is most undesirable in cases where speedy termination of pregnancy and labor are the ends in view.

The essential advantage in digital dilatation is more or less perfect control over advance that it offers. The latter begins when the operator chooses to have it, whereas, in hydrostatic dilatation, it is deferred in the presence of cervical tone and, when once started, is rapid or slow as the musculature responds with efficient or inefficient contractions. The dangers are the familiar ones of forcible dilatation and laceration.

All tone can be removed, dilatation facilitated, and the dangers of laceration reduced to the minimum if the precaution is taken to secure complete muscular relaxation before any attempt at dilatation is made. Relaxation of the kind begins in from 12 to 15 minutes after continuous administration of ether to the surgical degree is begun: it is complete in 20 minutes. At the latter time beginning pupillary dilatation can be detected and the cervix is found to present a surprising degree of dilatability. Within limits that thickness and inherent firmness of the cervix impose, the extent to which dilatation can be carried is determined only by strength of the operator's fingers and by the necessity for haste.

All that is required is dilatation sufficient to admit one finger and tip of a second, when progressive advance after the manner of Harris is possible. The procedure can be practiced in a cervix that is dilated sufficiently to admit a No. 2 Voorhees' Bag; and it is immaterial whether such preliminary dilatation has occurred spontaneously or has been brought about by use of a Goodell dilator.

With the Edgar method, where dilatation is begun by branched dilators and completed by the powerful tips of the first two fingers of both hands, the writer has had no experience. The procedure seems less physiological than the one earlier mentioned if for no other reason than because it attempts dilatation of internal and external os at the same time.

With proper sterilization of the outlet and with portion of the gloved hand coming in contact with the patient protected by a wet bichloride or lysol towel, the dangers of infection are no greater than arise from introduction of a hydrostatic dilator. They are even less in digital dilatation because time consumed in the business of dilatation is shortened.

Reasons for increased efficiency of digital over hydrostatic dilatation appear when "shape" of each dilating agent is compared with that of the dilating cervix. In the physiological mechanism of dilatation of the primiparous cervix, the canal loses its fusiform shape and becomes conical with beginning obliteration of the internal os. As the latter process continues, the "cone" with base uppermost becomes progressively broader and lower until, when complete obliteration is attained, apex is in relation with base and external os is in contact with present-

ing part. Forces bringing this about are outward and upward pull of the longitudinal uterine muscle fibers and downward and outward push of the intact bag of waters; and of the two the former is the more important because, by itself, it can accomplish dilatation when dilating efficiency of the bag of waters is lost through premature rupture.

Shape of the conical, hydrostatic dilator being fixed, there is no accommodation to changing shape of the dilating cervix; and the bag is forced downward and outward in an attempt at obliteration of the internal os and dilatation of the external at the same time. The mechanism is non-physiological; it is by so much inefficient; and it is thought to account for the fact that expulsion of a No. 2 Voorhees Bag for instance is rarely followed by continuation of contractions and spontaneous progress toward full dilatation.

On the other hand, tips of the dilating fingers separate after having passed through the external os and the dilating force they exert is directed laterally and primarily against internal os and lower segment. In this way the physiological mechanism of dilatation is simulated and satisfactory results are accomplished for this reason. Were the lower segment thin and the external os dilated sufficiently to admit two or more fingers, progress up to the point of full dilatation may be relatively rapid, the finger tips making possible the application of an efficient, centrifugal force to rim of the cervix.

There is less occasion for digital dilatation of the multiparous cervix for the reasons that spontaneous dilatation is more rapid in the first place and the hydrostatic dilator is a highly efficient means of artificial dilatation in the second. In multiparae, thinning-out of lower segment and dilatation of internal os and external os not infrequently take place at the same time; and to this variation from the purely physiological mechanism of dilatation the hydrostatic dilator is ideally suited.

Not the least advantageous feature of digital dilatation is the fact that facilities for practicing it are always available.

The types of cases in which digital dilatation promises most are pre-eclamptic toxemia and eclampsia in primiparae at or near term. Digital dilatation under deep ether anesthesia makes possible a high percentage of uneventful deliveries within minutes after the operation is begun; and the slightly increased hazards of anesthesia are believed to be more than compensated for by lowered fetal and maternal morbidity and mortality that more or less immediate delivery promises. In cases of the kind met about the seventh month, properly conducted digital dilatation can almost invariably be carried to a point where immediate vaginal section can be practiced.

Digital dilatation after the manner described is urged as a late first-stage procedure in spontaneous and otherwise uncomplicated premature labor when membranes rupture, in the presence of strong contractions,

before full dilatation. Here the compressible head bears the strain of complete dilatation poorly; and a short, uneventful second stage almost invariably follows complete digital dilatation.

In summarizing what has preceded it may be claimed for digital dilatation under complete ether anesthesia that it institutes and shortens labor in a class of cases where speedy termination of pregnancy is advantageous both to mother and to child, and that it accomplishes vaginal delivery with minimum risks of cervical and lower segment laceration. With such advantages possible, it is insisted the relatively slight dangers of infection and of untoward effect of the anesthetic may be unhesitatingly assumed.

289 STATE STREET.

(For discussion, see p. 364.)

URINARY SYMPTOMS IN WOMEN DUE TO URETHRAL PATHOLOGY ONLY*

BY ALBERT M. JUDD, M.D., F.A.C.S., BROOKLYN, NEW YORK

SINCE the author's attention, through his interest in vaginal palpation of the ureters, has been drawn to the symptom-complex of the urinary organs in women, he has been impressed by the numerous cases where the symptoms present might indicate bladder pathology but where no indications of such could be found. Neither could a study of the kidneys and ureters explain or clarify the case. In numerous cases of this type there has been some difficulty in introducing the cystoscope so that an instrument of smaller caliber than the usual size 26 had to be used.

In the usual study of these conditions, the cystoscopist has, it seems to the author, in the female considered the urethra only as a canal through which an instrument could be passed into the bladder.

In reviewing the literature on the subject, we find also a strange silence and poverty of thought, which in itself makes one pause. Many books on gynecology do not even mention stricture of the female urethra, or dismiss it with only a few words.

Careful study of his cases in the office has led the author to investigate, with the result that it is found that we have practically all the pathology presenting in the female urethra which may be found in the male. We have the same narrowing of the meatus, either congenital or acquired through injury of instrumentation or delivery, which, upon the advent of any type of infection takes on a new significance. This infection may be from a gonococcal invader, or from the even more common practice among women of wiping themselves from behind forward after urination, with resultant

*Read at a meeting of the New York Obstetrical Society, May 8, 1923.

infection from one or more of the various bacteria normally inhabiting the vagina. Any of these types of infection may terminate in what the author has been led, through the collaboration of Doctor Lederer, pathologist at the Jewish Hospital, to call a desquamative urethritis. There is a white urethral discharge containing various bacteria, pus cells and epithelium, with a strawberry-like urethral mucous membrane, as seen through the endoscope, and a thickened and tender urethra on palpation. This in itself may result in stricture formation from superficial erosions, or frequently an infiltrate around the urethra itself. There may be areas with only the urethra invaded, which can be detected by the localized tenderness and thickening on palpation, or the pathologic process may extend throughout the entire length of the urethra. I do not yet know which type of infection is most apt to result in the infiltrate. The gonococcal variety of infection is at times seen when active, but, in the writer's experience, has been more frequently seen when subacute or chronic. Often there is an invasion of the surrounding tissue by a soft infiltrate, easily palpable and tender, with a granular condition of the mucous membrane of the urethra as seen through the endoscope.

The final result of any type of infection of the urethra, when localized to any portion of the urethra, is apt to be stricture formation, easily detected by the use of bougies.

None of the books published show the proper method of palpation and stripping of the urethra when searching for discharge. It can only be done by using the forefinger of either hand upon that extent of the urethra which lies above the symphysis, changing to the thumb when the symphysis is reached; supporting the hand by pressing the finger which has been used in stripping the upper urethra against the back of the symphysis and advancing the thumb from this point downward until the discharge appears at the meatus. At the same time the forearm is supported by resting the elbow upon your knee or thigh. If the finger alone is used, it will, ninety-nine times out of a hundred, slip, and the findings, or rather lack of findings, will deceive the examiner.

The same causative factors apply to chronic infections resulting in pathology in Skene's glands, or the third gland, described by the author in a former article, as located on the roof of the urethra near the meatus. Destruction of these glands with the actual cautery is found by the author to give the best results; and it is done by the introduction of a very small electric copper point, from above downward; in the case of Skene's glands, protecting the posterior vaginal wall from injury by previously placing a Sims speculum in the vagina, (the patient being in the dorsal position) and when the heated cautery point breaks through it will be caught by the speculum and not the posterior vaginal wall.

Why it is that the treatment of conditions in the urethra of the female, of which he has spoken, has been so neglected by medical men, the author himself among others, is absolutely unexplainable to the writer in the light of his present knowledge. The same conditions apply here as in the male, therefore, why not the same methods of treatment? For the granular urethritis we must apply a two per cent solution of silver nitrate directly to the parts invaded, through the endoscope. This cannot be done properly by the means of a syringe or medicine dropper. The technic is easily acquired. For the infiltrate the author advises the passage of a sound once in seven or ten days, with massage over the sound. And for the stricture, if very

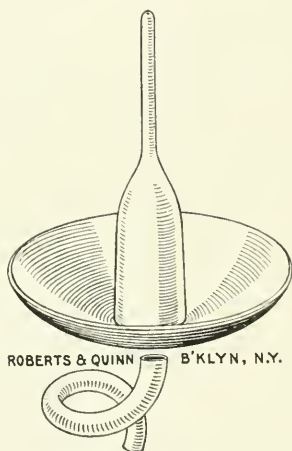


Fig. 1.

narrow and hard, cutting with a long, narrow bistoury, or the use of an urethrotome and subsequent dilatation by sounds, or, if larger, the use of sounds as in the male.

The treatment of acute gonorrheal infections of the urethra in the female has never been properly attempted. The author, in his first attempts to improve his technic, used the old Valentine irrigator with a very blunt nozzle; first washing out the urethra the same as in the male, then overcoming by means of pressure against the meatus and a proper height to the reservoir, the cut-off muscle, allowing the solution to flow into the bladder, being retained for a short time and then being discharged; the same as recommended for acute gonorrhea in the male. The author found that in certain types of cases this would be unsuccessful because of his inability to overcome the cut-

off muscle. In those cases he first used the instrument here presented (Fig. 1) with the Wheeler nozzle attached to a Janet syringe. Finding that this caused considerable pain he later added the end of a small catheter which reaches a short distance within the urethra and does away with the extreme amount of pressure necessary where the only obstruction to the outlet is through the meatus. This has worked exceedingly well and painlessly. The author is having some of these types of instruments made in both metal and rubber.

The solutions are the ordinary ones recommended by the genito-urinary surgeons. The one which is at present giving the greatest satisfaction to the author is acriflavine, 1:6000 to 1:4000. He has used mereurochrome and various other preparations. This is his routine at the present time, together with local endoscopic treatment.

The development of the technic requires considerable patience and one will have some failures in the beginning, but persistence will reward the one who gives it a thorough trial, with much satisfaction and appreciation over the ordinary methods.

This is an entirely new departure in the line of treatment of gonorrhea in the female. It is no improvement over the methods carried out by prominent genitourinary specialists in the treatment of this condition in the male; but perhaps it is at least as good as and better than the methods previously carried out in the treatment of gonorrhea in the female.

NO. 375 GRAND AVENUE.

(*For discussion, see p. 362.*)

MANUAL EXTRACTION OF THE PLACENTA*

BY THOS. R. GOETHALS, M.D., BOSTON, MASS.

(From the Department of Obstetrics, Harvard Medical School).

MANUAL removal of the retained or adherent placenta from the uterine cavity following pelvic delivery is reckoned among the most dangerous operations in obstetrics. This opinion is held because of the two principal dangers to which the patient is subjected: (1) Hemorrhage, which may occur before, during, or after the procedure; and (2) Infection, due to the implantation of bacteria from the vulva or lower vagina upon the placental site.

American and English obstetric literature yield little on which to base a quantitative opinion regarding the exact extent of these dangers. Among the few who make statements with reference to the morbidity and mortality of the operation, we find B. C. Hirst,¹ who says that adhesion of the placenta occurs once in 312 cases; that it is rarely complete; that it usually occurs in women who have had endometritis; and that it is often a consequence of syphilis. Many women, he says, die of hemorrhage, and about 7 per cent of sepsis. Polak,² in a paper on the management of the placental stage of labor, states that 10 per cent of cases with adherent placenta removed manually die of sepsis; that invasion of the uterus postpartum per vaginam is dangerous, and that in such cases, if the placenta is not found presenting at the external os, delivery should be completed by suprapubic extraperitoneal hysterotomy, with excision of the placental site or, if necessary, hysterectomy. In London, Bourne,³ in a recent review of sepsis in the Queen Charlotte Hospital, found that of 154 cases of manual removal of the placenta, 54, or 35 per cent, developed some form of uterine sepsis.

The subject is much more widely discussed in the German literature. Bumm⁴ in 1909 attributes a 10 per cent mortality to the operation of manual extraction. Zangemeister,⁵ (Doederlein's Handb. d. Geburtshuelfe), in 1917 gives figures from various sources, regarding incidence and results of the operation. Rogoff⁶ in 1912, reporting the cases from the Imperial Moscow Maternity, not only tabulated his own figures, but also published those of other Russian and several German observers. The figures are shown in Table I.

From such statistics it is evident that manual extraction carries with it a considerable morbidity and mortality. Rogoff's figures are the best, and in a discussion of his corrected percentages he states

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TABLE I

	TOTAL CASES	MAN. EXT. PLACENTA	MORBIDITY	DEATHS	MORTALITY
Ploeger ⁷		174	43%		
Koenigsberg ⁸		185		12	5.5%
Leo ⁹		329		20 (hem.) 6 (inf.)	6.1% 2.0%
Rosenthal ¹⁰	12000	39	66%		
Littauer ¹¹	11000	1:186 (all del.)		2	13.0%
Hegar ¹²					11.0%
Seyffarth ¹³	9465	79	35%		13.9%
Mattheus ¹⁴	5000	55			3.6%
Guttman ¹⁵		100			12.0%
Baisch ¹⁶		45			6.6%
Ahlfeld ¹⁷	5800	53			9.4%
Michailoff ¹⁸	220695	3877 (1:57)			
Agafonoff ¹⁹		1:70			
Hugenberger ²⁰	8036	135 (1:60)			
Rogoff ⁶	52011	1243	Gross, 15%, cases to Corr'd, 9.36%, cases to	6½ months 6½ months	0.37% 0.37%
			Gross, 30%, cases 6½ mos. Corr'd., 19%, cases 6½ mos.	to term to term	1.27% 1.27%

his belief that the high morbidity and mortality of the operation are due largely to infection before admission to the clinic.

One or two more references were not amiss. Winter,²¹ in a report of the Commission for Investigation of Puerperal Fever in December, 1911, stated that in 260 septic cases with a mortality of 33 per cent, 30 cases had had the placenta extracted manually, with a mortality of 46 per cent. Alletsee²² in 1912 reported 131 manual extractions in 7125 births at the Munich Polyclinic 1908-1911, only counting cases from 28 weeks to full term. Of the cases where the indication for the extraction was recorded, 111 (94.9 per cent) were for bleeding, 5 (4.3 per cent) for retention, and 1 (0.8 per cent) for fever; 81 per cent were in multiparae, and of these 10 per cent had had a previous manual extraction. The morbidity was tabulated as, severe puerperal fever 13.7 per cent, slight puerperal fever 17.1 per cent, afebrile 61.5 cent. Nine cases (7.7 per cent) died, five of hemorrhage, four of sepsis.

What are the conditions which justify us in exposing a patient to the dangers of manual extraction?

(1) Hemorrhage, due to a partially detached placenta, uncontrolled by stimulation of the uterus to contract. This, if profuse or threatening, is a well recognized indication: the uterus must be emptied and given opportunity to shut down. Hammerschlag²³ measures the blood lost, and when it exceeds 700 grams manually extracts. Most of us, however, will not adopt such an arbitrary standard.

(2) Retention of the placenta in utero for a certain period of time without evidence of separation. Such separation may occur and yet the placenta be unexpressible, even under an anesthetic, due to me-

chanical obstruction to delivery, e.g., constriction of the lower uterine segment, or obstruction by myomata or polyps. Here the indication is obvious: to withdraw the retained placenta as soon as the nature of the imprisonment is ascertained. On the other hand, the retention may be due to failure of the placenta to separate from its implantation, albeit no pathological adhesion exists; or to the presence of a placenta accreta, of which such specimens as have been examined show a lack of the normal spongy layer of the decidua, infiltration of the muscularis with villi, a hyperplasia of connective tissue, and a shreddy degenerated musculature. These two types of retained placenta may or may not give rise to some hemorrhage according as partial separation does or does not occur.

(3) Incompleteness of the placenta as shown by the absence of one or more cotyledons from the delivered tissue, also, possibly, by the persistence of hemorrhage after the uterus is supposedly empty. In such cases one must remove the bit of placenta if hemorrhage persists; if there is no hemorrhage, it is nevertheless wiser to remove it at once while the uterus is relatively free of organisms than to allow it to remain to become the nidus for a future infection or to cause a hemorrhage some days later which may endanger the patient's life directly or as a result of sepsis from removal or curettage at that time.

(4) Certain cases of operative delivery where the general or local condition of the patient seems to indicate immediate complete emptying of the uterus. Such cases include difficult and destructive operations through a contraction ring, certain cases of placenta previa and separated placenta where further hemorrhage is to be avoided, and vaginal cesareans for any condition where rapid emptying of the uterus is desired.

Generally speaking, the only question arising under the above indications deals with the length of time one should wait before removing the retained unseparated placenta. At the Boston Lying-In Hospital it is customary to undertake manual removal one hour after the birth of the child only after attempts at expression and Credé under an anesthetic have been fruitless. The Germans advise a wait, varying according to the individual, from two hours (Fehling²⁴) to indefinitely (Bumm²⁵). Hammerschlag advised waiting 6 hours in private practice, and 12 in hospital cases. The uterus is invaded by bacteria after 24 hours, and the removal of the placenta after that time resulted in his experience in three deaths in succession of pyemia; in his fourth similar case he did a hysterectomy. Liepmann²⁶ reports two cases in which the placenta could be expressed only after waiting 10 hours, and voices the opinion that without bleeding no placenta should be manually removed. Polak²⁷ states that he has left a num-

ber of placentae in the uterus for from 24 hours to 5 days, where there has been no hemorrhage, and has invariably seen them separate without manual extraction. When there is hemorrhage, he goes a step further, packing the interior of the uterus plus the placenta firmly with iodoform gauze; this has never failed to control the hemorrhage and separate the placenta.

The difficulty in the problem of manual extraction lies in the fact that for whatever indication the operation is undertaken one can never know beforehand, in a large proportion of the cases, just what condition will be met after the extraction is begun. Separation and extraction may prove to be a very simple matter, one portion of the placenta may be tightly adherent to the uterine wall, or the condition may prove to be that of "true adherent placenta" which may cause death from shock, hemorrhage, rupture of the uterus, or all three, in the operator's vain attempts to find a line of cleavage between the weakened uterine wall and the placenta.

The subject of placenta accreta or increta has been considered in a number of German articles. Clinically the condition should always be considered as a possibility in any case where the placenta does not separate during the third stage, especially in the case which gives a history of manual extraction in one or several previous deliveries. Vogt²⁸ and Schweitzer²⁹ have described the gross and microscopic pathological pictures in the cases of placenta accreta cervicalis which they have reported. Dietrich,³⁰ in addition to describing his own case, makes a very interesting summary of the condition as reported in the literature. In all, 19 cases besides his own have been described, and in each the condition has been confirmed pathologically. All the cases have shown a decidua basalis either entirely lacking, or imperfectly developed, with no trace of a spongy layer. The villi in each case were developed up to and in several instances into the muscularis, which was usually degenerated and characterized by an irregular overgrowth of connective tissue; in Dietrich's case the patient died of internal hemorrhage caused by the villi eroding through upon the posterior surface of the uterus, while the entire fundus and the posterior wall were almost completely replaced by placenta, with only a peritoneal covering in places.

The etiology of the condition is believed to be an atrophy, termed by Zweifel³¹ "exhaustion" of the endometrium, from which during pregnancy is developed either no decidua at all, or at best one very incomplete. Such atrophy may be due to rapidly repeated pregnancies, previous abortions, manual extractions, or to various forms of endometritis. All the cases reported have been in the multiparae. Moreover, cervical and lower segmental implantations of the ovum

are more apt to give rise to placenta accreta because of the relatively scant decidual reaction in these regions.

The treatment of placenta accreta, as summarized by Schweitzer and Dietrich in their papers, has been a mournful chapter in obstetric therapeutics. Practically all of the cases in which manual removal was attempted died, the majority with unremoved portions of placenta left behind. Although Ahlfeld³² has reported one case in which he packed a uterus containing an unremovable fragment which later came away when the packing was removed, tamponade was in most cases a futile resort, as the injured uterine wall had lost its contractility and soon bled through the pack. Two cases died following vaginal hysterectomy, of which one was that reported by Schweitzer. Only two cases of the 20 lived.

Both Dietrich and Schweitzer advise tamponade only as a provisional measure, to be followed by abdominal hysterectomy as soon as the operator has convinced himself that he is dealing with a placenta accreta. Kellogg³³ believes that such cases are seldom in shape to stand operation of this nature, and advises packing the uterus very tightly with gauze. He states that several cases handled by him in this way after unsuccessful attempts to extract the placenta manually have had the bleeding controlled; that removal of the pack twelve to twenty hours later has not resulted in further bleeding, and that the placental tissue has eventually come away in the lochia. In contrast to this view Schweitzer states that packing merely postpones the issue, as subsequent bleeding is well-nigh inevitable; that furthermore, should the patient survive and again become pregnant she is practically certain to have a recurrence of the condition.

To avoid manual extraction of the unseparated placenta with its high rate of morbidity and mortality, Gabastou³⁴ of Buenos Aires in 1914 published an article dealing with "hydraulic" removal of the placenta. His method, similar in principle to that described by Asdrubali³⁵ in 1826 and by Mojon³⁶ in 1827, consists in injecting warm physiological salt solution into the placenta through the umbilical vein. The solution fills the placental vessels, ruptures the capillary walls, and forms a "retroplacental hydroma." Separation of the placenta then takes place by the mechanical action of the hydroma and by the stimulation of the uterus by its heavy swollen contents. Traugott³⁷ has written several articles in enthusiastic appreciation of the Gabastou method, quoting 5 cases in 1916 in which placentas retained 70 minutes to 15 hours were easily removed; in two of them bleeding from partial separation was effectively checked. By means of the method, furthermore, in the Frankfort clinic, the ratio of manual extraction was reduced from $4\frac{1}{2}$ cases per 1000 from 1911-15 to $1\frac{1}{2}$ in 1916. Sklavounos³⁸ recommends the method, but says he has no figures for placenta accreta. Schwartz³⁹ reports the method suc-

cessful in 11 of 16 cases in 1919; two of the five unsuccessful cases proved to be placenta accreta, while the author states that the method was unsatisfactory in his experience for combating hemorrhage.

To attempt to arrive at some idea of the morbidity and mortality of the operation of manual extraction at the Boston Lying-In Hospital, the writer has searched the records for the ten years from 1911 to 1920, inclusive. During that time, in 8182 hospital deliveries by the pelvic route the placenta was manually removed 170 times, an incidence of 1:48 or 2.07 per cent. Of these 170 cases, 14 died shortly after delivery, giving a gross mortality of 8.2 per cent. On the other hand, of the 14 cases dying as the immediate result of delivery, 3 died of the terminal heart failure of eclampsia either on the table or shortly after being put back to bed; 1, a chronic nephritic, with hypertrophy and dilatation of the heart, died suddenly 4½ hours after delivery; 3 were previas, delivered by accouchement forcé and dying 50 minutes to 6 hours postpartum despite stimulation; 1, a uterus ruptured before admission; 2 of ruptured uteri following difficult deliveries; 1, of shock and hemorrhage 20 minutes after delivery by embryotomy and craniotomy through a contraction ring.

Of the three remaining cases, two died as a direct result of manual removal of the placenta and may well be described here. The third died of the hemorrhage necessitating manual extraction plus the extraction itself.

1. Case 24043. Para. 10. Age 38. No physical abnormalities. Full term. Vaginal examination revealed complete previa. Manual dilatation and extraction. Attempted manual extraction of the placenta, which was firmly adherent to the cervix, and lower uterine segment, thinned out, and spread over most of the uterus. Much like fibrous tissue. Placenta incomplete, and hemorrhage profuse. Death of shock and hemorrhage 5 hours after being put to bed.

2. Case 24172. Para. 1. Age 26. No abnormalities save question of mitral regurgitation. Full term. Low forceps delivery. Extraction of placenta after 1 hour and four attempts to Crédé. Patient went into shock. Placenta very adherent, removed completely. Very fibrous with many infarcts. Patient died of shock and hemorrhage 2½ hours after delivery.

3. Case 25948. Para. 5. Age 37. Four previous normal deliveries. Delivered in O. P. D. at term by version after attempted forceps. Sent to hospital for third stage because of shock, hemorrhage, and partially adherent placenta. Placenta extracted manually 5 hours 20 minutes postpartum, probably not complete. No tear of uterus found. Patient transfused. Died 24 hours postpartum of shock, hemorrhage, and cardiac dilatation.

The corrected mortality, then, is 1.76 per cent of cases, dying from a combination of conditions demanding manual extraction plus the extraction itself. Of these cases the first was undoubtedly one of placenta accreta.

The incidence of uterine infection in the 156 remaining cases

amounted to 39 cases or 25 per cent. As a control, 3012 routine successive deliveries were studied from the same standpoint, beginning in 1913, and extending over four years. Cases of abdominal cesarean and manual extraction following pelvic delivery were omitted. Furthermore, inasmuch as the risk of infection depends in a measure upon the method of delivery, the cases have been divided into the groups suggested by Kellogg¹⁰ in his paper on toxemia and sepsis.

As pointed out by Kellogg, the question of what constitutes sepsis differs with the individual observer. For the purposes of this paper those cases have been selected as infected which show a temperature of 100.4 degrees or higher at any one or more bi-daily readings, where there is noted a concomitant variation in the uterine consistency or involution from the normal, or alterations in the lochia.

TABLE II

	3012 CASES IN CONTROL SERIES			156 CASES MAN. EXT. PLAC.		
	TOTAL	INFECTED	%	TOTAL	INFECTED	%
Group 1 Normal delivery, or low forceps after complete natural dilatation	2612	123	4.7	50	13	26
Group 2 Dilatation by Voorhees bag followed by any type delivery	134	23	17.1	28	5	17.8
Group 3 Mid or high forceps, or breech extraction, following natural dilatation	198	17	8.5	22	6	27.2
Group 4 Manual or instrumental dilatation of cervix, followed by any type delivery	64	10	15.	48	13	27.
Group 5 Vaginal Caesarean section	4	1	25.	8	2	25.
Whole Group	3012	174	5.7	156	39	25.

The results of this are shown in Table II. They indicate that one in every four manual extractions shows evidence of uterine infection postpartum, and that the method of preceding delivery, so important in the control cases, makes very little difference in the outcome. Several German authors differentiate their infected cases into those "with light resorption fevers" and those with "pyemia." In the present series no such definite division can be made, but the cases have been divided arbitrarily into groups of mild and severe infection. In the mild group are included those in which the temperature reaches 103 degrees only once if at all, and with definite rapid improvement as the result of ice, ergot, and drainage; in the severe group are placed such cases as show a temperature reaching or ex-

ceeding 103 on two or more bi-daily readings, and which, despite treatment, run a prolonged course. These cases are shown in Table III.

The fact that the percentage of severe infections in the manual extraction group is only about one-third of that in the controls makes it seem possible that retained portions of placenta or membranes in the former cases may give rise to a sapremic infection following many of the deliveries. The ease with which placental fragments and bits of membrane are left behind in normal labors, where the placenta and membranes are recorded as "intact and complete," and the frequency with which such cases pass bits of retained secundines several days after delivery, make it much more likely that portions of the lacerated placenta which has been manually removed, or of its membranes, have been left behind.

TABLE III

GROUP	CONTROL SERIES 1893 DELIVERIES							156 MANUAL EXTRACTIONS		
	CASES	INFECTION CASES	PER CENT INFECTION	SEVERE INFECTION	PER CENT	DIED	PER CENT	PER CENT INFECTION	PER CENT SEVERE INFECTION	PER CENT MORT.
1	1623	75	4.6	25	33.3	4	5.33	26	7.69	0
2	70	13	17.1	3	23.1	2	15.3	17.8	20.	0
3	153	11	7.1	2	18.1	0	0	27.2	0	0
4	43	6	13.9	1	16.6	1	16.6	27	15.38	7.60
5	4	1	25.	1	100.	0	0	25	0	0
Whole	1893	106	5.59	32	30.1	7	6.6	25	10.2	2.56

Only one case died of infection in the group of manual extractions, No. 22880. She had had some sort of operation by her local physician and was sent in with ruptured membranes and a transverse presentation. Manual dilatation and extraction of a macerated fetus was done, and her uterus, ruptured, was packed after removal of the

TABLE IV

	CASES	INFECTED	PER CENT	SEVERE INF.	PER CENT	DIED	MORTAL
1. Hemorrhage group*	66	18	27.2	2	11.1	0	0
a. Antepartum (not previa)	11	4	36.3	0	0	0	0
b. " (previa)	32	10	31.2	2	20	0	0
c. Postpartum	23	4	15.2	0	0	0	0
2. Retention group	51	11	21.5	1	9.0	0	0
a. Totally adherent	10	4	40	0	0	0	0
b. Partially "	11	3	27.2	1	33.3	0	0
c. Retained	6	2	33.3	0	0	0	0
d. Unclassified	24	2	8.3	0	0	0	0
3. Incomplete group*	9	3	33.3	0	0	0	0
4. Group removed routinely and for reasons unspecified	30	7	23.3	1	14.2	1	14.2
Whole group	156	39	25.	4	10.2	1	0.64

*There were 7 cases of partial adhesion in the hemorrhage group, and one among the incomplete.

placenta. She died of peritonitis on the fourth day. The outcome of this case, certainly, can hardly be charged alone to the manual extraction.

Regarding the morbidity of these cases classified according to the indication for manual removal, we find the figures in Table IV.

Here again, there is but little difference in the morbidity, save in the increase of infection in the cases in which the placenta was known to be incomplete before the uterus was explored for missing fragments. So far as this proves anything, it indicates the probability of infection, sapremic (?) of unremoved fragments.

The series of deliveries in the Out-Patient Department of the hospital for the same period of time, 1911 to 1920 inclusive, yields a total of 16,486, in which are comprised 60 cases where the placenta was manually removed. Of these cases four died, giving a mortality of 6.6 per cent. A short account of these fatal cases follows.

1. Case 3953. Para. 2. Age 32. History of adherent placenta in her first labor. Showed general edema and albuminuria. Full term. Normal multiparous labor. Manual extraction 2 hours 5 minutes after birth of child, after several unsuccessful attempts to Cr  d  . Placenta removed in pieces. Hemorrhage not recorded. Pulse became imperceptible 5 minutes after delivery of placenta, and patient died.

2. Case 8451. Para. 7. Age 35. Full term. Delivered by version for brow presentation and antepartum bleeding; the latter was found to be due to a spontaneous rupture of the uterus. Placenta was removed manually as a routine, and uterus packed. Patient died of shock and hemorrhage en route to the hospital.

3. Case 35660. Para. 2. Age 23. Fullterm. Normal multiparous labor. Manual extraction of placenta undertaken 1 hour 45 minutes after birth of child. Placenta found firmly adherent. It was removed in pieces. Uterus soft, not contracting well, and hemorrhage profuse. Despite packing patient died 3¼ hours after birth of child.

4. Case 38083. Para. 1. Age 17. Full term. Low forceps delivery. Manual extraction of placenta undertaken for hemorrhage 25 minutes after birth of child. Placenta removed complete, membranes intact, without recorded difficulty, and hemorrhage ceased. Patient, however, died of acute cardiac dilatation one hour and 35 minutes after delivery of the placenta.

Of the above cases the second died as a result of rupture of the uterus, which was in no way contributed to by the manual extraction of the placenta. The first and third were probably placenta   accretae, although not proved by autopsy. The fourth probably died as a result of the hemorrhage necessitating the manual extraction. The corrected mortality, therefore, is 5 per cent.

Of the other 56 cases, the record of one is incomplete as regards the temperature chart and postpartum notes, although it is known that the patient was discharged from care obstetrically well. The morbidity of the remaining 55 cases is reckoned in Table V; Table VI shows grouping according to indication.

TABLE V

	CASES	INFECTED	PER CENT	SEVERE INFECTIONS	PER CENT	DEATHS
Group 1	40	16	40.	0	0	0
“ 3	12	5	41.7	0	0	0
“ 4	3	2	66.6	1	33.3	0
Whole group	55	23	41.8	1	4.3	0

TABLE VI

	CASES	INFECTED	PERCENT	SEVERE INFECTIONS	PERCENT
1. Hemorrhage	20	9	45.	1	11.1
a. Antepartum	1	1	100.	1	100.
(previa)					
b. Postpartum	19	8	36.8	0	0
2. Retention	35	14	40.	0	0
a. Total adherence	5	3	60.	0	0
b. Partial adherence	4	2	50.	0	0
c. Retained	11	1	9.	0	0
d. Unclassified	15	8	57.1	0	0
Whole Group	55	23	41.8	1	4.3

The percentage of infection is naturally higher in the Out-Patient cases than those in the hospital, inasmuch as the former are delivered in their homes, often under most adverse circumstances as regards hygiene and cleanliness. Furthermore, they are delivered, except in instrumental and other operative cases, by third and fourth year students, who follow the progress of the case by vaginal examinations. Notwithstanding this, the percentage of severe infections is remarkably low, and in no case did a patient die of infection following manual removal of the placenta.

The foregoing survey would seem to justify the following conclusions.

1. Manual extraction of the placenta following pelvic delivery carries with it the possibility that the operator may in any case find himself dealing with a condition, placenta accreta, in which the patient's life may be rapidly endangered from shock and hemorrhage.

2. Clinically placenta accreta occurred three times in the Boston Lying-In Hospital series; once in 8182 pelvic deliveries in the hospital, and twice in 16486 deliveries in the Out-Patient Department, or once in 8223 deliveries. Unfortunately, no autopsy was secured to prove the diagnosis pathologically.

3. No certain method has been found by means of which the presence of a placenta accreta can be foretold. Not until the operator begins the actual extraction can a definite diagnosis be made. "Adherent placenta" is, from a clinical standpoint, a relative term. No prediction can be made in any case of retained unseparated placenta whether one will find a placenta which is "easily peeled off," one which is "firmly adherent and has to be dug from the uterine wall," or one which is so blended with the uterine wall that no line of

cleavage can be made out. This may be as true of placentas partially detached as of those entirely unseparated.

4. One case in four of the hospital cases, two cases in five of the Out-Patient deliveries, showed some degree of uterine infection postpartum. This is an incidence almost five times that occurring in control pelvic deliveries in which the placenta was not manually extracted, so far as the hospital cases are concerned; and although no control series is practicable for the Out-Patient cases, the difference in surroundings and management would seem to account largely for the differences in results. Certainly the hospital and Out-Patient figures are remarkably parallel.

5. Such infection as occurred in these cases was usually of a relatively mild type. Only in one case, a hospital delivery where the uterus was ruptured, did death occur in this series. It seems probable that most of the infection which occurred was attributable to some degree of retention of secundines.

6. Results of the Mojon-Gabaston method of umbilical vein injection make the procedure one of choice to be used in the case of retained unseparated placenta without hemorrhage. It also deserves trial in cases where partial separation with slight hemorrhage has occurred, but it cannot replace manual extraction in the case of a brisk hemorrhage, where prompt action is necessary. Whether injection will separate and bring away a placenta accreta is questionable.

7. In the case of retained placenta in which injection has not produced separation within two hours of the birth of the child, manual extraction is indicated. We have had no experience with the method of letting such cases alone, nor with the method of packing the uterus on top of the placenta.

8. Manual extraction in such cases is ordinarily carried out without great difficulty or danger to the patient. Should separation of the placenta prove impossible or so difficult that placenta accreta is diagnosed, attempts at removal should at once be abandoned, the uterus packed tightly with gauze as an emergency measure, and laparotomy with hysterectomy performed, with transfusion before, during, or after the operation as the patient's condition indicates.

REFERENCES

- (1) *Hirst, B. C.*: Text-book of Obstetrics, 1918, p. 263.
- (2) *Polak, J. O.*: Surgery, Gynecology and Obstetrics, 1915, xxi, 590.
- (3) *Bourne*: Clinical Journal, London, 1921, 1, 456.
- (4) *Bumm*: Kurzes Lehrbuch der Gynaekologie, 1909.
- (5) *Zangemeister*: Doederlein, Handbuch d. Geburtshilfe, 1917.
- (6) *Rogoff*: Monatssehr. f. Geburtsh. u. Gynak., 1912, xxxvi, 175.
- (7) *Ploger*: Quoted by Zangemeister, see ref. 5.
- (8) *Koenigsberg Clinic*: Ibid.
- (9) *Leo*: Ibid.
- (10) *Rosenthal*: Quoted by Rogoff, see ref. 6.
- (11) *Littauer*: Ibid.
- (12) *Hoar*: Ibid.
- (13) *Seyffarth*: Ibid.
- (14) *Mattheus*: Ibid.
- (15) *Guttmann*: Ibid.
- (16) *Boisch*: Ibid.
- (17) *Ahlfeld*: Ibid.
- (18) *Michailoff*: Ibid.
- (19) *Agafonoff*: Ibid.
- (20) *Hugenberger*: Ibid.
- (21) *Winter*: Quoted by Liepmann, Berl. Klin. Wchnschr.

1919, lvi, 300. (22) *Alletsee*: Inaug. Diss. 1912, Zentralbl. f. Gyn. 1913, No. 50. (23) *Hammerschlag*: Zentralbl. f. Gyn. 1920, xlv, 781. (24) *Fehling*: Quoted by Hammerschlag, see ref. 23. (25) *Bumm*: Ibid. (26) *Liepmann*: Berl. Klin. Wehnschr., 1919, lvi, 300. (27) *Polak*: Personal communication, 1922. (28) *Fogt*: Deutsche Med. Wehnschr., 1917, xliii, 1041. (29) *Schweitzer*: Arch. f. Gynak., 1918, cix, 618. (30) *Dietrich*: Zeitschr. f. Geb. u. Gyn., 1921, lxxxiv, 579. (31) *Zwiefel*: Quoted by Schweitzer, see ref. 29. (32) *Ahlfeld*: Quoted by Hirst, see ref. 1. (33) *Kellogg*: Personal communication, 1923. (34) *Gabastou*: Muench. med. Wehnschr., 1914, lxi, 651. (35) *A. drubali*: Quoted by Schulze, Zentralbl. f. Gyn., 1918, xlii, 313. (36) *Mojon*: Ibid (37) *Traugott*: Zeitschr. f. Geburtsh. u. Gyn. 1916-17, lxxix, 427. (38) *Sklavounos*: Monatschr. f. Geburtsh. u. Gyn., 1920, li, 291. (39) *Schwartz*: Zentralbl. f. Gyn., 1920, xlv, 217. (40) *Kellogg*: AMERICAN JOURNAL OF OBST. AND GYN., 1922.

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LACTATION ATROPHY OF THE UTERUS

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ONE of the first to describe this condition extensively was Frommel. He considered lactation atrophy of the uterus an abnormal hyperinvolution and was of the opinion that loss of nutritive bodies through prolonged lactation was the cause of this peculiar and not infrequent condition. He claims that weakly, poorly nourished, hard working, prematurely aged mothers are more often affected. Frommel distinguished between excentric and concentric atrophy and found the latter with a shorter uterine cavity, the more frequent. He believed that the prognosis concerning restitution of a well developed lactation atrophy is bad.

In contrast Simpson, Fränkl, and Thorn, especially the two latter, believe that nearly every uterus of an amenorrhoeic, lactating woman becomes more or less hyperinvolved. Thorn is of the belief that this condition, which disappears not later than six weeks after weaning, is normal and physiologic, about two-thirds of all lactating women should show it, and that it becomes pathologic only by reaching an abnormal degree, especially by extending to the cervix, the ovaries and the suspensory apparatus of the uterus and by the appearance of pronounced general symptoms. Thorn believes that the constant contractions in the uterus occurring during the act of nursing as a reflex action from the nipple should be primarily the etiological factors in the lactation atrophy. Normally the uterus of a nursing mother shows much quicker involution than of those not nursing. The loss of nutritive material during nursing should also be responsible, therefore, its frequent occurrence in weak, undernourished mothers with an irritable vegetative and vasomotoric nervous system. Contrary to the common belief, he holds the menstruating nursing mother the better nurse than the amenorrhoeic one. Both he and Fränkl do not advise weaning the baby on account of atrophy, but believe in

interrupting lactation at once if the cervix shows decided signs of atrophy and if the general symptoms are marked.

Lactation atrophy should not be confused with the irreparable atrophies of the uterus observed in the puerperium after severe infections as described by Ries.

Foges opposed the theories of Thorn and Fränkl and stated that the atrophy of the uterus during nursing is independent of the act of lactation, that is, its reflex action, but is produced by an arrest, or, as Novak puts it, by a temporary deficiency of the ovarian function. Temporary or relative amenorrhea and relative sterility during lactation are a fact and certainly only to be explained by a dysfunction of the ovary.

What is the cause of this ovarian deficiency,—is it a reflex action from the mamma, trophoneurotic, is it a chemical action, hormones, from the mamma, restraining ovulation, does the mamma possess an internal secretion, is it a continuous secretion or synchronical with lactation?

The influence of ovary and placenta upon the mammary gland are known. Hyperemia, hypertrophy during menstruation, the large hyperplasia of the mamma during pregnancy, are due to hormonal action from the ovary, placenta and to some degree the fetus. Hyperemia and enlargement of the mamma I found as a constant sequence to injection of corpus luteum extract. Ashner shows microscopic pictures of mammae of virgin guinea pigs following injection of placenta emulsion, which do not differ from the pregnant mamma. After extirpation of the ovaries in the new born guinea pig, no mammary tissue is developed. An interesting fact is that, while the placenta is responsible for the growth of the mamma during pregnancy, milk secretion does not set in until the placenta has been expelled. The influence of ovary and placenta upon the mamma is thus established; how about the reverse? Extirpation of both nonlactating mammae has no influence upon the other genital organs in the human subject, ovulation, menstruation, gestation occur normally. In animals Scherbaek found the symptom complex of heat diminished after extirpation of the mamma. Schiffman injected mammary extract in guinea pigs and found the ovaries and uterus much smaller than in control animals. Reduction of fibroids after injection of Mammin—a mammary extract—has been repeatedly reported. L. Adler injected rabbits shortly after the beginning of pregnancy with mammary extract of pregnant rabbits and noticed interruption of the pregnancy in nearly all animals. He also found in the injected animals very marked hyperplasia of the medullary portion of the adrenal glands and holds this responsible for the abortion. The question arises, whether the results of Adler's and Schiffman's

experiments are caused by specific action of the mammary extract or whether they are just reactions of nonspecific proteins. Polano could improve severe cases of dysmenorrhea by producing hyperemia of the mammae by Bier's method. He concludes from this the existence of an internal secretion of the mamma influencing ovary and uterus. Federoff speaks of a direct antagonism of ovary, endometrium and mamma. The experience of dairymen, that castration of the cow produces increased milk production, should be mentioned here. On the other hand, it is well known that milk secretion during menstruation is usually decreased and that a sudden diminution of milk and poor quality of same is often the first sign to the nursing mother that she is pregnant again.

Thus we have seen the ovary incites the development of the mamma in the embryo and adolescent, and stimulates, assisted by the placenta, its growth during pregnancy. Ovarial action decreases the milk production during menstruation and suppresses it during pregnancy. Schroeder noticed not infrequently after castration in women, never pregnant before, colostrum formation. Lactation, activity of the mamma, produces a physiologic amenorrhea and relative sterility, it reduces or inhibits ovarian function. Experimentally mammary extract of lactating animals produced atrophy of ovary and uterus. We seem to be justified in presuming that the lactating mamma has an internal secretion, that these hormones act directly upon the ovary, producing a normal temporary atrophy of the ovary and by the way of the ovary, atrophy of the uterus. This temporary dysfunction or deficiency of the ovary is Nature's protection of the offspring and the propagation of the race; it insures nourishment for the nursling when most needed and prevents renewed pregnancy. With normal limits this atrophy is physiologic, hyperproduction of these hormones by the mamma will be followed by a degree of atrophy of the ovary closely simulating that of the approaching climacteric in its histologic picture as well as in its symptomatology. I operated upon a woman thirty-one years old, third para, for an acute appendicitis. The woman, who had nursed her third baby eleven months had all the symptoms of lactation atrophy, and was for this illness under my care the last two weeks. At the operation the uterus had the appearance of an infantile uterus, the ovaries looked atrophic. In the right ovary I found a cyst of the size of a hazelnut. I removed it by a wedge shaped excision, taking some of the normal looking ovarian tissue along. Sections through this tissue showed pictures similar to the ones in the early climacteric, no maturing follicles or in the state of degeneration, only atretic and primordial follicles. If the lactating mamma does not produce the normal amount of these hormones, the nursing mother menstruates normally or nearly so, the hyperproduction of these hormones results in dysfunction and tem-

porary atrophy of the ovaries and uterus. If the production of these hormones continues over an abnormally long period through prolonged lactation, a permanent atrophy of the ovary might result. These are the cases Frommel mentions, which give a bad prognosis. I have among my patients two women, one a secondary para, thirty-two years old, who never menstruated after her second baby, which she nursed nine months; another woman, a primipara of thirty-five, who never menstruated after nursing her baby eight months. Both women began to show symptoms of lactation atrophy about the fourth month after their delivery. Both women had normal deliveries, had big babies and had an abundance of milk. Around the seventh month the symptoms of lactation atrophy were very pronounced, the uterus small, the general symptoms very marked. Advice to wean the babies was not followed. Symptoms of the climacteric became more marked and continued for several years with complete amenorrhea. Either the lactation atrophy of their ovaries was so far advanced as to be permanent or we could suppose that their mammary glands still continued to secrete the hormones, retarding ovulation. It would not be impossible to explain in this way the cases of relative sterility long after partus, which some women show.

SYMPTOMATOLOGY

The symptoms are manifold, partly produced by the ovarian hypofunction and the consequent disturbance in the interrelation of the other internal glands, partly by the disturbed function of the autonomic and vegetative nervous system. Unlike in the physiologic gradually occurring in climacteric, the other endocrine glands here have no time to accommodate themselves to the hypofunction of the ovary, which fact influences the symptomatology.

One of the main symptoms is amenorrhea, sometimes the only one present. I would state, that the menstruating, nursing mother never shows any atrophy of the uterus. The women, with lactation atrophy, as mentioned before, are often run down, look anemic, under nourished, sallow, have lost in weight, feel very weak, have lost all ambition. A very constant complaint is a dull backache, and a complaint, that while nursing, the baby seems to sap all their strength. The symptoms produced by sympathetic irritation are hot flushes, congestions, hyperidrosis of hand or feet or head, hyperacidity, obstinate constipation, pollakiuria, vasomotor disturbances, such as parasthesias in the hand or feet, tachycardia, precordial oppression, (angina pectoria spuria), dyspnea, hypertension, headache. There are always present psychical symptoms, depressions, or the women are extremely irritable.

The objective symptoms are, the smallness of the uterus, either of the concentric or excentric type, reduction in hemoglobin, hyper-

tension. Some authors observed constantly an increased reaction following adrenalin injection. In short, the symptomatology is very similar to that of the climacteric.

PROGNOSIS

The prognosis concerning restitution to normal is good, but has to take the general condition of the patient into consideration. It is claimed that this condition is found mostly in women with a low vitality, poor nervous and vasomotor equilibrium, in older multipara, and weakly individuals, but I will say here, that one of the most persistent cases I observed was in a very strong, healthy looking young woman weighing two hundred and eight pounds and six feet tall. I am under the impression, that I found it not infrequent in women, who previously had an infantile uterus, began to menstruate late, had late conception; in short with hypoplastic genitals.

The treatment consists in weaning the baby, rest for the woman, good wholesome diet with an abundance of raw fruit and milk. The use of ovarian preparations like whole ovary or corpus luteum is indicated.

Prophylactically we should advise the woman not to nurse longer than eight months, to nurse regularly every four hours, not to nurse at night, to get two hours rest during the day, a diet rich in proteins, fat and raw fruit and vegetables and cereals. If the nursing seems hard on the mother, supplemental feeding should be started early.

CONCLUSIONS

1. Lactation atrophy of the uterus is the result of hormones produced by the lactating mamma.
2. These hormones inhibit ovarian function.
3. Hyperproduction of these hormones results in atrophy of the ovaries and secondary atrophy of the uterus.
4. If the lactating mamma fails to produce these hormones or produces them in small amounts only, the nursing mother menstruates normally or nearly so. These mothers never present symptoms of lactation atrophy of the uterus.

WHAT I HAVE LEARNED FROM MY ONE HUNDRED AND SIX CESAREANS

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JUST as the motor car has revolutionized locomotion, so has the uterine suture of Säger influenced cesarean section. Once the dernier resort of midwifery, with a mortality of one hundred per cent, modern hysterotomy for dystocia is as great a contribution to obstetric art as podalic version or the forceps. A product of twentieth century surgery, its results vary with the personal equation of the operator and the inconstant conditions of each patient. It is only two score years ago that Dr. Robert T. Harris, a foremost obstetrician of that time, wrote, "looking into the past records of New York City and of the United States at large, of ten hospital cesareans in our country, Dr. Lusk's case is the first to recover up to 1887; he is the first to save both mother and child in all the history of New York, the only one of seven operators to meet with success under the Säger method in the United States."

In the same paper (*American Journal of Obstetrics*, Oct., 1887), he adds this historical note: "The July number reports nine cases of cesarean rip by cattle, saving five women and four children. Of the four children one was six months and was fatally injured, three were killed by contusion of the chest, four were extruded dead, five died in eight hours. The tenth case was reported by Dr. Powell of an Indian squaw, in a buffalo hunt in 1852, who made a perfect recovery under Indian treatment. This was by applying plastic clay made into a stiff mud with water. The wound was held together, the clay placed over it, then over this was put a layer of wood fibers. These layers were repeated until a cake, two inches thick, covered the abdomen from flank to flank. The woman was kept on her back during the treatment." This sounds like one of the stories Paré tells of war surgery in his time, when arteries were closed by the actual cautery.

The necessity of doing cesarean sections in the tenement or family home has passed with the multitude of public and private hospitals. Better help, professional environment, a wealth of surgical material and preparedness for emergencies, all help to lighten the burden of responsibility in the hospital. For many years to come the family doctor will continue to be the usual accoucheur, and he is mustering up the courage to be a cesareanist, an office which he has hitherto

yielded to the expert. There is a hue and cry abroad that cesareans are being done too often by unskilled men, for insufficient indications, and therefore with bad results. It may be so, but I allow the same courtesies of judgment to others that I claim for myself, believing as I do that most doctors do the best they can in the stress of emergency.

The modern classical cesarean has three ideals: prevention of peritonitis, a clean, well united uterus, and safety in other pregnancies. To obtain this ideal are proposed special surgical technic, intra- or extraperitoneal approach, the supravaginal uterine incision, and absorbable or nonabsorbable sutures. These questions are answered by men of various minds, as they are influenced by the study of results, but it is evident that as yet no one man knows it all.

The indications for choosing this method of delivery are thus far chaotic. The former absolute indication of contracted pelvis is now extended to include almost any freak of pregnancy or parturition. Cesarean sections are done for eclampsia, placenta previa or abruptio, to prevent the suffering of labor, impacted breech, for illegitimacy, to conceal pregnancy; *Nomen est legio*. It is inevitable that any comparatively new operation should pass through these crude stages, but at length will be established the classic ideal; indication, site of incision, technic, suture, and postoperative management. The earlier dictum, "once a section, always a section," is ignored by some obstetricians, who "run their luck" against the chances of uterine rupture by a later vaginal delivery. Statistics of today show that only four per cent of cesareanized women rupture the uterus in subsequent vaginal labors, and women have been delivered normally without the midwife or doctor knowing they had been previously sectioned. But a recent experience of the writer with ruptured uterus at term has taught him that the danger is a real one and not to be slighted.

Should a primipara be sectioned as freely as a multipara, and how much do previous vaginal examinations contraindicate section? There can be no hard and fast answer to either question; the conservative will hesitate, the radical says, "Save the living child at all hazards."

A word as to the operative technic. The classic abdominal cesarean section is usually easy in the primipara and grows more difficult in later sections, ordinarily from adhesions due to the earlier operation. It need not be restricted to the surgeon proper, but in an emergency any general practitioner with a modern surgical training can do it. It is always a major operation, either the simplest in character or complicated enough to try the skill of the expert. Unquestionably success depends largely upon experience and good assistants. As to the details of the operation, it seems to matter little in the result

whether the abdominal incision is made above, lateral or below the umbilicus, whether the uterine suture is absorbable or nonabsorbable, whether the uterine incision is extra- or intraperitoneal. Many good operators will disagree with these statements, but, in ordinary cases, personal experience and case-reports seem to confirm them. Two-thirds of the author's cases were hospital patients, most of whom were certainly infected by repeated vaginal examinations and forceps trials, and yet there was no mortality from this cause alone.

The number of personal cases, upon which this paper is founded, is too small for the author to assume to prescribe for others the indications for section in border-line cases. Anyone able to do a cesarean section at all is generally capable of deciding for himself whether that is the best way to deliver the given woman. In some border-line cases a trial labor is eminently proper. It means evaluation of the fitness of this patient for the strain of labor, of fetal adaptation to the birth canal, the presentation and position, the manual dexterity of the operator, etc. The chief objection to it seems to be the risk of infection from vaginal examination to learn whether the trial is succeeding. For the expert with sterile gloves and anal examination this risk may be taken, but the author prefers an elective operation, at a time convenient to the patient and himself, rather than a compulsory operation under contrary conditions.

It would be a waste of time for the author to describe the technic of a cesarean operation. The classic method is fully given in modern textbooks, which are as good guides as any printed description can be. It seems better for the occasional operator to familiarize himself with that method alone, rather than attempt to follow the more brilliant and difficult mode of someone, to whom cesarean sections are an every day occurrence. Instead of allowing a woman to exhaust herself in futile labor, labor which too often ends in a fatal high forceps extraction or craniotomy, he might better elect the safer and saner cesarean operation.

A word in explanation of the summary of cases herewith appended. All but about a dozen of these have been done within the last ten years and most of them at the Maine General Hospital. The obstetrical service there is strictly emergency and all of these patients had been attended before entrance by physicians. None of the eclampsia patients were in labor, all had had one or more convulsions, and four of these never regained consciousness after the first. The variety of indications for which section was made is large, but urgent enough, in the judgment of the operator and consultants, to warrant the operation. The mortality may appear high for the small number of cases, but only one death, possibly two, was due fairly to the operation. The death from ileus was probably caused by an error in technic,

that from acute septic metritis and ruptured uterus was inevitable under any method of delivery, and their clinical history is peculiar enough to warrant publication.

A tall, well formed, American woman, forty-two years old, a farmer's wife in prosperous circumstances, had an abdominal operation for tubercular peritonitis several years ago. Since then there had been two miscarriages, one at the seventh and one at the eighth month, each fetus being stillborn. Her last menstruation was July 4, 1921, and she was first visited by the author in counsel January 22, 1922. Urinalysis showed no albumin or casts, but 0.25 per cent sugar. Wassermann was negative. In view of the unexplained death of the former children, she was advised to continue pregnancy as long as possible, to get a viable child. After usual treatment sugar disappeared in a week. She continued well up to two weeks before term when she entered a private hospital for careful observation and preparation for a cesarean section. This had been advised because of the family's urgent wish for a living child, which it was feared might be lost in a difficult labor because of her age, or from the same cause that had killed the other two.

March 11, section was done at a private hospital. She was then in excellent health, there was strong fetal heart and active motion, first cephalic position, and no vaginal examination was made. Upon opening the abdomen by the high incision the omentum was found to cover the uterus with many firm adhesions. The uterus was uncontracted and the wall very thick. A strong, active male, weighing six and three-quarter pounds, was extracted by podalic version. Hemorrhage was moderate, and the uterus was closed by three continuous sutures of plain gut. Abdomen closed in usual manner.

After the operation there was more than ordinary pain in the abdomen, requiring frequent hypodermics through the day and night. Early the next day the heart failed, there was great distention of the intestines, cathartics and enemas were ineffectual, though an intravenous hypodermic of pituitrin was followed in ten minutes by a large gas motion. She died twenty-eight hours after operation.

At the autopsy the abdominal wound was found unchanged, there was extreme ileus, and many adhesions at the site of the appendix, which was absent. The uterine sutures were all loose, the incision gaping, the muscle softened and sphacelated, and the interior filled with a pulpy mass of clot. Further examination showed the right fallopian tube highly inflamed and almost gangrenous, which was certainly the source of the metritis.

There had been no symptom of this salpingitis during life. Whether it had any connection with the former tuberculosis and the two miscarriages and whether she would not have died under any method of delivery, are some of the questions which are still unanswered in this most unfortunate case. It was the first and only death in the author's series of thirty-five elective cesarean operations.

No. 104. A tall, healthy, Polish woman, thirty years old, a housewife and *vi para*, who could not talk English, was admitted at the Maine General Hospital at midnight, Nov. 9, 1922. Her previous clinical history was as follows;

The first child was born naturally in Russia. The second was stillborn in this city by forceps. The third was delivered by craniotomy. The fourth child was delivered by a cesarean, her first, at the hospital, June 29, 1919. The indication was absolute, the internal conjugate measuring less than three inches. Labor had been active for two hours before entrance. Section was simple and easy, with birth of a strong, active male, weighing nine pounds. The puerperium period was stormy; she had bronchopneumonia on the second day with resolution on the tenth. All skin sutures suppurated and the fascia separated at the center of the incision,

but the wound closed satisfactorily under dichloramin-T dressing. Iodide catgut sutures were used.

She was found in active labor March 25, 1921, and taken at once to a private hospital. The second section was difficult owing to dense adhesions of peritoneum to uterus, and the uterine scar from the former operation was quite plain. The abdominal incision was through the left rectus and a strong female, weighing 7½ pounds was delivered. The abdominal sutures supplicated as before but there was firm union at last. Pneumonia of the right lower lobe followed operation, which finally cleared up, and she went home on the twenty-seventh day.

On the morning of Nov. 5, 1922, she was said to have fallen upon her left side. During the day fetal motion stopped and slight flowing began, with a little abdominal pain. She was at this time two weeks short of term. This condition continued unchanged for two days, when she was sent to the hospital by her physician at midnight, Nov. 9. At that time flowing had stopped, and there was only "grumbling" abdominal pain, but bleeding began again in the early morning and she was packed by the intern. It was difficult to learn the character of the pain, as she could make herself understood with great difficulty.

Section was done at 9 o'clock, Nov. 9. Temperature normal, pulse 140. No fetal sounds or motion. By vaginal examination the cervix was found half dilated, a mass thought to be placenta covered the greater part of the os, but no presenting part of the fetus could be felt. She was flowing freely dark, clotted blood. The diagnosis was placenta previa or abruptio. Manual dilation of the cervix was rejected because of the probability of tearing it during extraction, and section chosen because least dangerous in her bad condition.

There was a wide scar on each side of the umbilicus, and the abdomen was opened through the right rectus. Everything was adherent inside. The abdominal cavity was filled with large and small dark clots, but there was no fresh bleeding. The fetus and placenta were loose in the cavity, lying to the right of the uterus, which was firmly contracted and lay in the lower quadrant. It had ruptured completely from the fundus to the isthmus through the scar of the second cesarean, the edges of the tear being ragged and gaping. Hysterectomy was done at once, but despite active stimulation she died upon the table. The fetus was desquamating, and was a female weighing five pounds.

So far as is known to the author, this is the first case of ruptured uterus after a cesarean in this locality. The absence of severe constitutional symptoms, either at the time of rupture or afterwards, misled the author and consultants in diagnosing the true condition.

SUMMARY

Emergency cases, seventy; elective (not in labor), thirty-six.

Indications.—Contracted pelvis, 34; second sections, 12; third sections, 3; obstructed ramus from enchondroma, 1; ventrofixation, 2; placenta previa and abruptio, 11; prolapse of cervix, 3; hydatidiform mole, 2; cancer of cervix, 1; missed labor, 3; eclampsia, 14; impacted breech, 3; preeclampsia, 6; cardiac disease, 4; by request, 3; pyelitis, 1.

Maternal Mortality.—Ruptured uterus, 2; previous attempts at delivery, 1; impossible delivery of impacted breech, 1; hemorrhage from placenta previa, 1; eclampsia, never regained consciousness after first convulsion, 3; pulmonary embolism, 2; acute sepsis, not known before section, 1; ileus, 1.

PUERPERAL SEPSIS (BACTEREMIA) CAUSED BY B. INFLUENZAE

BY WILLIAM THALHIMER, M.D., AND BEATRICE M. HOGAN, A.B.*

IN 1911 one of us¹ reported a case of puerperal infection with cultivation of *B. influenzae* from swab cultures from the uterus. At this time the only case of *B. influenzae* infection of the female genital tract found in the literature was a case of pyo- and hydrosalpinx described by Kiskault.² One additional case has been reported since then. Morton and Famulener presented a case before the New York Pathological Society, December 13, 1922, which yielded a pure culture of *B. influenzae* from a pelvic abscess.

We have had the opportunity of studying another case of puerperal infection caused by *B. influenzae*, which, so far as we can determine, makes a total of four published cases of infection of the female genital tract caused by this organism.

Patient, Hospital number 14163, primipara, age thirty-four, admitted in the first stage of labor, 7/5/22, at 5:30 P.M. Labor and delivery were normal, the baby was born at 10:30 P.M. The position was L.O.A., a right lateral episiotomy was performed, and low forceps used. The placenta was delivered ten minutes later by Schultze's method, and the episiotomy repaired with four interrupted catgut sutures. Nitrons oxide-oxygen anesthesia. Patient complained of pain in the gall bladder region during labor.

The patient was carefully observed during gestation and no abnormality occurred except several mild attacks of pain in the right upper abdomen with tenderness over the gall bladder region, the patient having suffered from similar attacks during the previous two years. The gall bladder could not be palpated, and operation was not considered advisable. The heart and lungs were normal.

Past History:—Patient had an appendectomy three years ago after an attack of "flu". The history is otherwise unimportant, except that of respiratory infections. The tonsils were removed six years ago. The patient has had a chronic nasal catarrh for years, and during the fall, four years ago, she had several fairly severe attacks of "grippe" accompanied by chills. In the summer two years ago, there was an acute middle ear infection with a discharging ear. Last winter, there were many severe "colds" and several attacks of severe sore throat. The patient has had no "colds" nor sore throats since September, 1921, the beginning of this pregnancy. Pain over the gall bladder region occurred at intervals during this pregnancy.

Course after Delivery:—

7/7/22. Forty-eight hours after delivery the patient had a chill, lasting twenty minutes.

7/8/22. Chill, temperature 103°. Lochia normal.

R.B.C. 4,000,000; Hb. 78%; W.B.C. 10,600; Polys. 73%.

*From the laboratories of Columbia Hospital, Milwaukee.

Blood Culture—negative.

- 7/10/22. A daily chill the last two days.
- 7/17/22. An up and down temperature has persisted, and in the last twenty-four hours, four chills, with temperature as high as 105°. Soft apical systolic murmur.
- Blood culture*:—showed fourteen colonies to each c.c. of blood. These were minute (about 1 mm. in diameter), colorless, transparent, and showed about them typical hemoglobinophilia, with a dark red accumulation of hemoglobin for a distance of from one to three mm. from each colony. The colonies were made up of extremely small, slender, pleomorphic Gram negative, non-motile bacteria, which could be cultivated only on blood agar (*B. influenzae*).
- 7/18/22. R.B.C. 3,850,000; Hb. 80%; W.B.C. 8,900; Polys. 87%. Loehia, normal. Episiotomy incision is healed.
- 7/19/22. *Transfusion*, 500 c.c., Vincent tube method. Today patient complained of pain in her left leg, and in the next few days femoral phlebitis developed.
- 7/21/22. Chill.
- 7/22/22. *Transfusion*, same method.
- 7/23/22. Chill.
- 7/24/22. *Blood culture*:—10 colonies of *B. influenzae* to each c.c. of blood.
- 7/26/22. Several chills.
- 7/30/22. A profuse, purulent, offensive vaginal discharge today, which was not present before.
- 7/31/22. *Vaginal culture*:—a few colonies of *B. influenzae* and a few colonies of staph. aureus. *Vaginal smear*:—many pus cells, great numbers of large and small Gram negative bacilli, a few extra-cellular Gram negative cocci.
- 8/5/22. Bimanual Examination. The left broad ligament reveals a large, board like induration, the left adnexa are fixed, and the left fornix is practically obliterated. The right adnexa feel normal and are freely movable. *Culture from Cervical Canal*:—many colonies of *B. influenzae* and a few strep. viridans.
- 8/9/22. A chill. *Blood culture*:—negative.
- 8/12/22. Chill yesterday. *Blood culture*:—five colonies of *B. influenzae* to each c.c. of blood. *Transfusion*, 500 c.c. Same method.
- 8/13/22. Slight chill.
- 8/30/22. Several chills have occurred during the last 17 days.
- 9/5/22. Temperature reached normal and remained normal during remainder of stay in the Hospital.
- 9/16/22. Patient discharged. Bimanual examination (final note); uterus is fairly movable, and except for a first degree backward displacement, is perfectly normal. The induration in the left broad ligament is somewhat less, and that in the left fornix is almost gone. No mass is found.
- 2/15/23. Patient has remained free from symptoms.

Discussion.—Several points seem of importance in these four cases. There is a marked similarity of the two cases of pelvic abscess, and of the two cases of puerperal infection. The thing which seems most striking is the apparently slight virulence of the strains of *B. influenzae* in all four cases.

The source of infection is unknown in each case, and none presented

a recent history of respiratory infection of any kind. Kiskault's case, however, had an attack of "influenza" eight or nine years previous; Morton's and Famulener's case, three years previous, during the influenza epidemic, had an illness characterized by chills, fever and cough which kept her in bed a week; Thalhimer's case had a severe attack of influenza 15 years previous; and our case, four years ago, had several attacks of moderately severe "grippe."

As has already been pointed out¹ the relationship between the pelvic infection with *B. influenzae* and the attacks of influenza which occurred a number of years before is not clear, and the explanation of an etiological relationship is not justifiable. Nevertheless, this sequence in all four cases should be borne in mind.

The two cases of pelvic inflammation had well localized purulent pelvic foci, with symptoms of some duration before operation was necessary. The infection was therefore subacute in nature and each case recovered promptly after drainage of the pelvic abscess.

The two cases of puerperal infection had a rise of temperature and chills on the second and third day after delivery. The chills lasted for only three days in the case previously reported,¹ but persisted for fifty-five days in the recent case, though there were intervals without chills, one as long as nine days. A blood culture taken of the first case four days after delivery during the period of chills, was negative and as no further chills occurred, and the temperature gradually subsided, no more blood cultures were taken.

In the second case a blood culture taken on the second day of the period of chills was also negative, but on the tenth day a blood culture showed fourteen colonies of *B. influenzae* to the c.c. of blood, on the seventeenth day, ten colonies and on the thirty-sixth day there were five colonies to the c.c. Both cases developed a pelvic exudate which gradually absorbed spontaneously. The recent case developed a left femoral phlebitis, and also a transitory heart murmur, which for a time it was feared indicated a bacterial endocarditis, but this murmur was only temporary.

Three whole blood transfusions were performed by Doctor J. L. Yates, by the Vincent, paraffin tube method. Transfusions have been reported as of service in overcoming puerperal bacteriemia. The transfusions were not followed by a chill, which they are more prone to cause in cases of bacteriemia than in other cases, and a considerable drop in temperature followed, lasting for forty-eight hours after the first transfusion, for twelve hours after the second and for twenty-four hours after the third. After each interval chills recurred, and finally ceased eighteen days after the last transfusion, the temperature reaching normal five days later. The impression was gained by everybody in attendance that the transfusions aided the patient in her recovery.

It is an extremely interesting observation that though both vaginal and cervical smears showed great numbers of various types of bacilli and cocci, both Gram positive and Gram negative, only a few colonies of staphylococcus aureus and streptococcus viridans developed in the cultures, although many colonies of *B. influenzae* grew.

The recovery of this case, which had a positive *B. influenzae* blood culture, indicates the mild degree of virulence of the infecting strain of this organism, suggesting that it does not belong to the type of influenza bacillus which Cohen³ found so fatal in cases of bacteriemia accompanied by meningitis in children.

This case must undoubtedly have been one of puerperal infection (source unknown) caused by *B. influenzae*, with the development during its course of an infected pelvic thrombophlebitis, accompanied by a bacteriemia, and then later by a femoral thrombophlebitis and a pelvic exudate. The bacteriemia disappeared when the thrombosed veins, which were feeding the organisms into the circulation, spontaneously freed themselves of *B. influenzae*.

We are indebted to Doctor R. W. Roethke for the privilege of studying this case.

REFERENCES

- (1) *Thalhimer, W.*: Johns Hopkins Hosp., Bull, 1911, xxii 293. (2) *Kisskault, K.*: Influenza bacillen bei Pyo und Hydrosalpinx, Centralbl. f. Bakt., 1906, xli, 701. (3) *Cohen*: Ann. de l'Inst. Pasteur, 1909, xxiii, 273.

STRICTURE OF THE ESOPHAGUS OCCURRING DURING PREGNANCY

By PORTER P. VINSON, M.D., ROCHESTER, MINNESOTA

From the Division of Medicine, Mayo Clinic.

TWO years ago I reported six cases of stricture of the esophagus that had occurred during pregnancy, usually as a result of pernicious vomiting. I have since observed three cases which are herewith reported:

REPORT OF CASES

Case 1 (A349024). Mrs. A. R. K., aged forty years, who was examined at the Mayo Clinic, February 2, 1921, had had five pregnancies, four of which were normal. A fifth pregnancy had begun in April, 1919, and had been accompanied by heartburn, but no other symptom was noted until in November when persistent vomiting began. There was no dysphagia, but all food was vomited within an hour after ingestion, and from lack of nourishment the patient had lost considerable weight and strength. December 26 a large amount of brown fluid was vomited, and accompanying this there was marked burning, and substernal pain. No blood or pus was identified in the vomitus. Labor was induced December 28, and a healthy baby was born. During the week following delivery the patient did not vomit,

but expectorated much thick mucus secretion. A week later it was noted that fluids seemed to lodge in the lower portion of the esophagus. This symptom was partially relieved for a few days by the administration of belladonna, but soon became progressively worse and on April 10, 1920, it was necessary to perform a gastrostomy. During the period of vomiting and restricted diet, the patient had lost sixty pounds in weight. For a few days after the gastrostomy, fluids passed through the stricture into the stomach, but complete closure then occurred, although the patient was able to regurgitate into the mouth small amounts of fluid taken through the gastrostomy tube. At the time of examination a stricture, 32.5 cm. from the incisor teeth, was located and gradually dilated to 44° F. with complete relief from dysphagia. The gastrostomy wound was allowed to close, and the patient has continued to carry on the dilatations at home.

Case 2 (A362570). Mrs. E. H., aged thirty-five years, had been married for two years and had become pregnant in May, 1920. She had felt perfectly well until about the first of February, 1921, when lassitude and generalized edema developed. These symptoms became progressively worse, and at the end of a week incessant vomiting began. A normal baby was delivered instrumentally February 17, but the vomiting continued for three weeks. There was very definite evidence of renal insufficiency. On the ninth day after delivery the patient vomited a large amount of blood after which, for a month, her fever rose to 102°; she was semiconscious for two or three weeks. A month after the baby was born, it was noticed that there was obstruction to the passage of food in the lower esophagus, and at the time of examination at the Clinic, June 23, 1921, fluids only could be taken. There had been a weight loss of 25 pounds. A stricture was found, 28.75 cm. from the incisor teeth, and was dilated with graduated sounds to 43° F. with relief from dysphagia. Further dilatations were carried on at home by the patient's husband.

Case 3 (A406774). Mrs. R. C. D., aged twenty-six years, had had two pregnancies, the first of which was uneventful. There had been considerable vomiting during the last pregnancy, and she had lost 20 pounds in weight. During the last two months of gestation there had been considerable distress beneath the xiphoid during meals, or immediately afterward, which was relieved by vomiting. The symptoms had increased gradually in severity. The patient was examined October 5, 1922, six months after the birth of the baby, and a short stricture was located just above the cardia. This was easily dilated on October 6 to 45° F. with relief from all symptoms. The following day the patient went out of town to visit friends and, on her return in the evening, she complained that her heart had been beating rapidly. The next morning marked weakness was noted, and on the evening of October 8 she died very suddenly. A dark colored stool was passed, and mild, mid-epigastric pain was noted just before death. A postmortem examination could not be obtained, but esophageal hemorrhage seems to have been the most probable cause of death.

COMMENT

In 1878 Zenker and von Ziemsen reported nine cases of antemortem rupture of the esophagus and attributed this disaster to esophagomalacia involving the lower half of the organ. They believed that the condition was caused by "(1) the presence of stomach-contents, rich in pepsin and acid, (2) regurgitation, (3) protracted retention of regurgitated food in the esophagus, (4) insufficient warmth of the body, and (5) cessation or great weakness of the circulation of blood supply in the esophagus."

In 1919, and again in 1921 Pringle and his associates emphasized the frequency of antemortem digestion of the esophagus, and asserted that the principal symptom of this condition is the vomiting of black or brown material. In some cases red blood was vomited. Substernal or epigastric pain was also often noted by them. They examined the esophagus in sixteen fatal cases and in all, the process was limited to the lower portion of the tube. Healing processes were observed in some of the organs examined.

The vomiting of blood or dark colored material was a prominent symptom in five of the nine cases observed in the Clinic, and in another, it is probable that a periesophageal abscess ruptured into the esophagus. Six of the patients had substernal or epigastric pain. All of the lesions were located in the lower half of the esophagus. It seems reasonable to assume that the strictures reported here represent the healed stage of a digestive process which occurred in the esophagus during life.

BIBLIOGRAPHY

- (1) *Pringle, J. H. and Teacher, J. H.*: Digestion of the Esophagus as a Cause of Postoperative Hematemesis, *Brit. Jour. Surg.*, 1918-1919, vi, 523-536. (2) *Pringle, J. H., Stewart, L. T. and Teacher, J. H.*: Digestion of the Esophagus as a Cause of Postoperative and other Forms of Hematemesis, *Jour. Path. and Bacteriol.*, 1921, xxiv, 396-412. (3) *Vinson, P. P.*: Oesophageal Stricture Following the Vomiting of Pregnancy, *Surg., Gynec. and Obst.*, 1921, xxxiii, 412-413. (4) *Zenker, F. A. and Ziemssen, H.*: Solutions of Continuity in the Esophagus, *Cyclopedia of the Practice of Medicine*, New York, William Wood and Company, 1878, viii, 90-110.

A CASE OF SEXUAL PRECOCITY

BY HERBERT THOMS, M.D., F.A.C.S., NEW HAVEN, CONN., AND
A. A. HERSHMAN, M.D., NEW HAVEN, CONN.

THE following case report is submitted for publication in order to place upon record the facts and data concerning an unusual case of sexual precocity. While it is true that these cases strictly belong to the field of pediatries, yet they are of interest to the gynecologist because, as a rule, it is he who is first consulted by the parents of these children. This is due to the fact that, at least in those cases which are due to hypersecretion of the ovary, the condition is regarded as simply one of menstrual disturbance. Investigations, however, have taught us that this symptom is but a minor part of a complex in which probably all the glands of internal secretion play important parts.

In making a differential diagnosis of these cases we must distinguish between those which are due chiefly to pineal involvement, those of adrenal involvement and those due to oversecretion of the ovary. The case here described is a striking picture of this latter condition, the chief characteristics of which are noted to be, enlargement of internal and external genitalia, menstruation, enlargement of the breasts, and the presence of pubic hair.

The patient, J. B., a Russian Jewess, is at present three years and eleven months old, born July 22, 1919. The father is alive and well. The mother died of influenza in 1920. Both the mother and maternal grandmother had a normal menstrual history. She has one brother six years of age who appears normal in all respects. Both of these children were born normally without instruments. The patient has never been seriously ill. Tonsillectomy was performed one year ago in July. Dentition occurred at seven months and she began to walk at 11 months. When she was about a year old the father noticed that the breasts were larger than normal. In February, 1923, she went through a period of normal menstruation which lasted four days and was accompanied by a good amount of flow. She was seen at this and subsequent times by Dr. A. A. Hershman. Six weeks later a similar menstruation occurred which lasted three days. After an interval of three weeks this was repeated. Then followed a period of amenorrhea lasting 8 weeks when another 3 day flow was experienced. This has been the last period of the present time.

The physical examination shows a well nourished, plump child in good health. The physical appearance is striking as shown by the accompanying picture. The immediate impression is that of a well developed, mature woman of child stature. The height is 42 in. (norm. for five and a half yrs.), weight 50 lbs. (norm. for about seven and a half yrs.) The physical examination of the head, neck, chest, abdomen and extremities reveals nothing abnormal. The breasts are those of a woman. The primary areola is well differentiated, the nipples well developed and protuberant. There is no secretion. There is no axillary hair. The pubic hair is moderately thick and covers the pubes. The external genitalia show the labia to be well developed. No internal examination has been made. In order to rule out any possibility

of intracranial tumor an x-ray examination of the sella turcica was made. The plates show a normal sized cavity in that region. In the recent exhaustive article on this subject by Reuben and Manning (*Arch. Ped.*, xxxix, Dec., 1922-Jan., 1923) special attention was directed to the advanced ossification of the wrist centers in these cases. X-ray examination of the wrists in this case shows beside the centers normally present at this age, the trapezoid which usually appears at six years, the pisiform which usually appears at 6 and a half years, and the styloid process of the ulna which is seldom seen before the eleventh year. The anthropometric and mental status of this case was surveyed by Professor A. Gesell of the Yale Psycho-Clinic

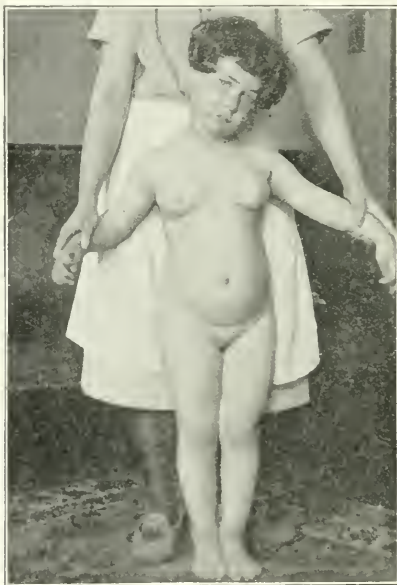


Fig. 1.

His findings besides the height and weight previously mentioned are dynamometer: left grip 8 kg., right grip 10 kg., (norm. for 72 mos.). Cephalic diameters: longitudinal 16 cm., transverse 13.2 cm., brachycephalic index 82.5. Chest girth over breast 60 cm.

Mental diagnosis: Average intelligence. No evidence of psychopathic personality or of mental deficiency. Slightly below normal in motor, language and performance tests. Mental age three and a half years. Voice timbre richer and deeper than average, but no symptoms of marked precocity in personality traits. We are indebted also to Dr. L. H. Wheatley, of New Haven, for the x ray studies in connection with this case.

Society Transactions

THE NEW YORK OBSTETRICAL SOCIETY

MEETING OF MARCH 13, 1923

DR. RALPH H. POMEROY IN THE CHAIR

The meeting was devoted to a discussion of sociologic topics of interest to the specialty of obstetrics and gynecology. The following papers were presented:

1. **The Broader Aspects of Birth Control Propaganda from the Medical Viewpoint**, DR. GEORGE W. KOSMAK. (For original article, see p. 276.)
2. **Prenatal Care as Viewed from the Public Health Standpoint**, DR. RALPH W. LOBENSTINE. (For original article, see p. 286.)
3. **Control of Midwives**, DR. HAROLD BAILEY. (For original article, see p. 293.)

DISCUSSION

DR. ROBERT L. DICKINSON.—Dr. Kosmak endorsed both in his previous paper of 1915 and in the present paper, the great need of study of this problem. The National Research Council has decided to put \$25,000.00 into study of sex-life. After going over a good deal of the literature, I say we know nothing about the normal sex life of the normal woman, basing such knowledge on good clinical wisdom, and it is time we found out something about it. We do not know what the normal, or, let us say, the average practice of the ordinary husband and wife is. We know next to nothing about the efficacy of contraceptives. We have at last found out a little about the percentage of their use—not through a medical group, but through one of these confounded lay groups that butt into our business and find out something that we need to know.

Now, the Cancer Society and one or two of the other tuberculosis groups have tackled medical problems led by medical men. Suppose the obstetrician and gynecologist do the same. The start has been made for us. The Bureau of Social Hygiene of New York sent out a questionnaire to a thousand intelligent women concerning their sex life. Of these 70 per cent were college and university graduates and many were teachers. All precautions were taken to secure anonymity. The sheets that came back had no names on them. This report of Dr. Katherine Bement Davis finds happiness in marriage reported by 87 per cent. Health after marriage was reported to be as good or better than before marriage in 84 per cent. Those who used contraceptive measures (not abstinence) were 74.11 per cent. The average number of their pregnancies was two and one-half, and one-third of this group were in an age when reasonably they might be expected to have other children. Thus, if this thousand comprises a fair cross section of intelligent American womanhood, the stigma of race suicide can hardly apply, or the fear of the nation dying at the top. The reasons given for the use of these

measures may be roughly grouped as 30 per cent economic and 30 per cent health, and it is noteworthy that the main attack on birth control that it makes for childless marriage, seems to be met by the smallness of the number who took precautions because they wanted no child. These were 3.5 per cent, and this figure includes temporary postponements.

The remainder of the thousand, the group who used no preventives, show 29 per cent sterile marriages and a very large proportion of one-child sterility.

Now, if we got busy ourselves, what would we do? We would first study the problem and find out what there was to it. We know that contraceptives are generally used. The question is, are they harmful? Are they harmless? Do you know? I don't know. Are they efficacious? The social hygiene returns find that with the two most effective measures, the use of the condom and the use of coitus interruptus, the figures (which have not been published) are about 12 per cent failures, but they do not state whether the condom was properly used, tested and lubricated. In other words, no medical details of this study have been made. If the antiseptic douche was effective in 76 per cent, we must not know whether a suppository was used before it and so on. The same need holds good with the cervix cup pessary.

Now, how should we attack the problem? It should be done by some organization which would study the matter. You or I would not go into such a thing unless it was representative, unless some of the leading men of the profession went into it. Under those conditions, would you be willing to start a research? It is up to the obstetricians and gynecologists to decide physical harm or harmlessness. Suppose the money to study the literature, to make the necessary secretarial and other organization is forthcoming. Suppose that men at the head of alienist work, the leading T. B. men, say, "For our patients we need the obstetricians to make such a study and to instruct our patients in contraceptive methods, and to sterilize them when necessary." Would you be willing to join such a committee, to help to organize such a committee? That question was put up to me. Now, the need having been shown, and there being no other organization to undertake it, a small group of men have made a tentative outline of what such a thing should be, and that group is made up of the Director of the Social Hygiene Association, a leading internist, a leading health official, a gynecologist, a prominent nurse, a director of a social agency, (other members are to be added), such work, policies, personnel and procedure to be strictly under medical control. If they are not, we will have nothing to do with it.

Dr. Kosmak cannot see the necessity of an office. Well, there has got to be some kind of a secretarial office: there has got to be some kind of a loose organization to start the experiment. Patients must be sent to some place to be distributed, with a history, with a signed paper that such advice is necessary. Such an office would not examine them, but, simply being a bureau of distribution, would refer them to a clinic where such work should be done. Then the office assembles and studies the results, as such a center alone can.

Does that scheme appeal to you? Is that the way to attack? Is that the way the New York Obstetrical Society should endorse it, or should some Sanger group do it? It has to be one way or the other, I agree with Dr. Kosmak as to the many objectionable ways of the other method or attack on the problem. I do not see any other alternative but for us to guide such a movement to see that it goes slowly, and experimentally, with no publicity, with no general propaganda business, in order to avoid the very things which Dr. Kosmak objects to.

To some of you, to the leaders, I have been asked to send this proposition in order to see whether you approve of it, whether these bigger clinics in New York would be willing to try out some such scheme as this.

DR. G. W. KOSMAK.—As Mr. Dickinson has well said, this is not a problem that can be dismissed by an evening's discussion. It is something that has agitated the world for centuries, and I do not know that we are going to come any nearer to a definite or a satisfactory conclusion, than the Romans did, but they kept at it until Rome fell, and then somebody else took it up and they fell, and I suppose that some day we will fall with our proposition. The laity is taking this thing up in a "serious manner," and we have the two classes of propagandists that I referred to in my paper. I do not like that word propagandist and believe that the proper term for them would be agitators.

We have one group which is sincere in their belief as far as it goes, but, unfortunately, it does not go far enough. I have met with lay groups who thought that if they would only be allowed to get this information from the doctors that that would be all that was necessary. They believe that there is an absolute, safe and harmless method of preventing conception, and I know some of these groups base their faith on one contrivance—some of these women have told me that if they only could have a womb veil it would answer the purpose, and they have told me if we could distribute this thing that is all that would be necessary. Well, any of you who have practiced obstetrics and gynecology know that is not all that is necessary. It takes a lot more than that.

Dr. Dickinson called attention to the necessity for a much closer study of this subject than has heretofore been made, a study which would be based on scientific information, and not merely sympathetic observation. It seems to me that this Society could very well undertake and sponsor the appointment of a committee to really study this subject and come into contact with these outside groups and try to sway them in the right way. I am sure Dr. Dickinson has done a great deal to sway certain people in this direction and undoubtedly there are other members of this Society who could do likewise, and it seems to me, Mr. President, that we might well propose the appointment of a committee of five members, to undertake in an informal way the discussion of this problem, and when the opportunity offers to bring their conclusions before this Society and their possible relations with some of the lay people interested.

Dr. Dickinson's scheme is the first rational one proposed. It leaves the carrying out of this problem in the hands of the medical profession where it really belongs.

If these "propagandists" are given a leeway, and especially if they are backed by certain members of the profession who use their medical title for doubtful purpose, we are going to get into trouble, and I cannot yet countenance the establishment of any center at which cases could be referred to other clinics. Now, every doctor, and for that matter, every hospital can be equipped, or can equip itself with facilities for distributing contraceptive information, and I personally must be more fully convinced of the necessity of establishing a center of this kind.

Dr. Dickinson has referred to certain contraceptive measures. It is very true we do not know whether they are effective or not. Couples come to us after three or four years of married life and wonder why they have no children. We examine them and find many reasons for this. Dr. Rubin's method has shown that a great many of these women are absolutely sterile from tubal obstructions. In many cases, however, the male has not been examined, and, as we all know, the female is not always to blame. Undoubtedly in 50 per cent of cases the males are responsible.

These people get a wrong conception of what this all means, and to prevent themselves from having children they use these contraceptive measures, and later when they are tired of it they wonder why they cannot get children, and it is simply because the wrong diagnosis has been made in the case.

NEW YORK ACADEMY OF MEDICINE
SECTION ON OBSTETRICS AND GYNECOLOGY

STATED MEETING, HELD APRIL 24, 1923

DR. WILLIAM E. CALDWELL IN THE CHAIR

DR. CHARLES W. STROBELL read a paper entitled, **Chemical Surgery in Chronic Cervical Endometritis with Rationale, Technic and Case Reports.**

The operation which I am about to describe strikes at the root of practically all chronic pelvic diseases of women, having their origin in cervical infections. The procedure suggested itself to the writer from a study of the work of Curtis, Sturm Dorf and Langstroth. These men have shown conclusively that ascending infections do not often involve the pelvic organs by continuity of endometrium and lining of the fallopian tubes, but rather by way of the uterine lymphatics, affecting primarily the parametria and secondarily the adnexa. This conception is absolutely in harmony with our knowledge of the functions and operations, in health and disease, of the lymphatics in general. In dealing with chronic cervical endometritis the problem is to remove the diseased mucosa and at the same time to destroy infection resident in the glandular prolongations in the muscularis, without destruction of these glands; and to preserve intact, through regeneration, the musculature, contour and physiological function of the cervix. Long observation of the behavior of potassium hydroxide on human and animal tissues—the peculiar therapeutic inflammatory reaction in structures adjacent to those acted upon—the striking regeneration to normal of mucous surfaces, the desirability of avoiding cutting, or lacerating procedures, coupled with the fact that the chemical creates its own aseptic field, led the writer to a trial of this agent as a radical cure. Application of this idea has been followed by most satisfactory results. I have now applied this treatment to upwards of 100 cases, and without disappointment. The novelty of the operation consists in the substitution of a chemical substance for the curette, etc., in affecting the radical cure of chronic cervical infections.

The best time to perform the operation is directly after the cessation of menstruation, since this will assure ample time for completion of the healing process before the next period. It is best to have the patient enter the hospital at 2 o'clock in the afternoon, when she is immediately put to bed. The best narcosis is twilight sleep carried to the surgical stage. At 4 o'clock in the afternoon, a hypodermic tablet containing morphine hydrobromide, gr. $\frac{1}{4}$; hyoscyne hydrobromide, gr. $\frac{1}{400}$; caetoid, gr. $\frac{1}{64}$, is administered hypodermically. At 4:30 o'clock a second tablet of similar strength is administered. If the patient is of the phlegmatic type, the second tablet need not be over half strength. At 5 o'clock the patient is moved to the operating room.

In preparation for the operation, ropes of absorbent cotton, $\frac{1}{4}$ inch in thickness, saturated with water and wrung out in a towel to near dryness are cut into $\frac{1}{4}$ inch sections, to be used throughout the operation. These are of value in protecting the vaginal fornices from the action of the chemical, those becoming saturated being quickly replaced with fresh ones. The patient is placed in the

lithotomy position, with a folded bed sheet pad under the sacrum to take the strain from the back. The heels and knees are well supported to secure the utmost relaxation and comfort. The field of operation is prepared in the usual way. Shaving is not necessary. A glass catheter is used to assure an empty bladder. A weighted speculum is placed in position and the anterior and posterior lips of the cervix caught up with curved Skene tenacula. Graduated uterine sounds are then successively introduced into the cervix, until a dilator can be introduced. Should this process disturb the patient novocain solution with adrenalin may be used, though this is seldom necessary. The uterine cavity is now explored and any instrumentation that may be necessary is done. The anterior lip of the cervix is then drawn forward by the tenaculum in the left hand of the operator, the posterior lip being made taut by traction on the tenaculum in the right hand of the assistant, standing to the right of the patient. Two of the cotton sponges are laid close to the cervix, in the posterior fornix, and under the tip of the blade of the speculum, to protect the posterior vaginal wall. The cervix is then moderately drawn downward and the anterior and lateral fornices packed. The cervix is wiped dry and filled with adrenalin-soaked gauze for two minutes. This being removed, the free end of a crayon of C. P. potassie hydroxide, held in the grasp of a long curved hemostat, is rapidly, yet gently introduced into the cervical canal, until it meets the resistance of the contracted internal os. The crayon should be made to sweep the walls of the cervical cavity, with a circular, wiping motion, under moderate pressure. At the expiration of five seconds the crayon should be removed, and the excess liquid caustic and blood mopped away. Water, applied freely, is the most effectual neutralizer and control. The sponges in the fornices are removed and water-soaked sponges applied in rapid succession, washing out the deeper portion of the vaginal sac. The parts are then prepared for a second cauterization, lasting only four seconds. The inclination to keep on cauterizing must be resisted. Should a third application be necessary the caustic should be applied for a period not to exceed two seconds. The diseased tissues must be removed, but only down to the muscularis. If this is done properly, the muscularis not only will not cicatrize but the histologic elements of the mucosa will be regenerated, and the canal lined with normal ciliated columnar epithelium. This operation is simple, safe and aseptic, the loss of blood is negligible, and there is no danger of postoperative hemorrhage.

The dressing consists in lightly packing the fornices and vaginal canal with two thick ropes of plain sterile gauze liberally smeared with sterile vaseline and packed around the cervix, the ends projecting from the vagina. This dressing may be removed by the patient at the end of forty-eight hours. The patient is seldom troubled with nausea or vomiting and after her breakfast the next morning is allowed to return to her home. The after-treatment consists of the administration of three vaginal douches daily, consisting of warm, boiled saline solution,—one teaspoon of common table salt in each gallon of water. After two weeks twice a day will be sufficient, until the end of the fourth week when the douches may be discontinued. During these four weeks the patient is inspected every fourth day to make sure that all is going as it should. Under this treatment leucorrhœal discharges cease almost at once, cervical erosions, ulcerations and hypertrophies gradually subside and disappear, and the portio vaginalis resumes its normal form and color. The woman experiences a new lease of life and is "headed" away from the operating table toward which she was drifting.

DISCUSSION

DR. FRANCIS W. SOVAK.—I have visited Cuvellier's clinic and have seen cases treated by a method similar to that described by Dr. Strobell. I have seen

them use a sodium hydroxide and lime pencil, which they forced into the cervix and up to the internal os. I brought some sodium hydroxide and lime pencils back with me and tried them on 20 cases at Bellevue Hospital. Three days after the treatment the patients complained of profuse hemorrhage and on the day following the treatment they complained of severe pain. For three days after treatment they complained of pain due to an adnexal condition.

DR. STROBELL, (closing).—I am at a loss to know just why pain and hemorrhage followed in the cases cited by Dr. Sovak, unless it was due to lack of familiarity and experience with the chemicals, coupled with nonconformity to well-known surgical principles. Also I do not advocate the use of fused soda and lime, as I have had no experience with it. Certainly in my own work there has been no instance of either operative or postoperative pain or hemorrhage from the use of caustic potash according to this technic in the approximately one hundred and eleven cases thus far completed.

I think it absolutely essential to dilate the cervix as preliminary to the application of the caustic. Free dilatation affords ready access to both cervical and uterine canals, it facilitates exploration, drainage and control, and obviates postoperative muscular spasm. Cervical dilatation enables me to see each step of the operation and to assure myself that the potassic hydroxide crayon does not penetrate to the internal os nor enter the uterine cavity.

I have definitely worked out the length of time contracts of the chemical and the diseased mucosa, which are five, four and two seconds, respectively and consequently, to the exact degree of destruction of the diseased tissues.

Those who have received this treatment have not complained of untoward sequellae, and invariably return to their accustomed duties in the home, office, or workshop on either the day following operation, or the next thereafter.

Personally, my experience with this operation is that it is simple, safe and one hundred per cent effective in the treatment of this disease, and if generally employed would lessen the need of intraabdominal mutilations fully 50 per cent.

The formation of scar tissue is not a part of the operation. The technic has been particularly developed to obviate such a misfortune. Muscularis is not to be cauterized, and scar tissue could only result from unskilled application of the method. Dilatation facilitates ample access and control. Familiarity with the "drive" of the chemical is the keynote of success. The operation does not in the least interfere with future childbirth; it restores the uterine canal to normal, and cures sterility due to cervical catarrh. The operation has not interfered with subsequent childbirth.

DR. EDWIN WILSON HOLLADAY read a paper entitled **Treatment of Pelvic Infections**. (For original article, see p. 299.)

DR. ISIDOR KROSS read a paper entitled **Pelvic Inflammations, Their Etiology and Pathology**. (For original article, see p. 308.)

DISCUSSION OF PAPERS OF DRS. HOLLADAY AND KROSS

DR. JOSEPH BRETTAUER.—While there might be some difference of opinion regarding some of the minor points, there can hardly be any discussion about the main principles laid down by Dr. Holladay.

Personally I have never deviated from the line of ultraconservatism, in the acute stage of pelvic inflammatory disease. There was a short period when, stimulated

by reports from various sources, I interfered earlier with the idea of retaining part of the pelvic organs, and possibly their function. My results were extremely unsatisfactory; pregnancy practically never occurred and secondary operations had to be resorted to frequently.

Today I am more conservative than ever before in finding indications for interference in these cases; many young women are admitted repeatedly to my service in the course of years for conservative treatment and thus escape operation. When I do operate, I am rather inclined to be radical.

DR. WILLIAM E. STUDDIFORD.—One or two points are to be emphasized. First, with reference to puerperal infections, I know from long experience and from the type and amount of material handled that the conservative plan of treatment, as carried out by Dr. Holladay and Dr. Holden, has given most excellent results. One trouble in dealing with puerperal infection in times past was, first, a guilty conscience on the part of the attending physician, and second, the urgent demands on the part of the family who felt that something must be done. The result was that the obstetrician tried to check up as to whether he had done something wrong, and the family were filled with the old idea that something must be done. Under such circumstances the mere giving of fresh air seems to be a poor substitute when the family wants to know when the obstetrician is going to do something. I also know that there is no better place than Bellevue Hospital in which to handle such cases. The wards are suitable and the patients are relieved from expense. A case of puerperal fever needs careful handling and it is expensive to provide adequate care; on the other hand, the lack of adequate care leads frequently to fatal results. I recall one patient who was carried along for a period of five months, with a daily visit by the physician and the daily question whether to operate today or possibly tomorrow. That patient was visited by many physicians and it was always a question whether to operate or to let her alone, and we let her alone. That was five or six years ago and the woman has had two children since. Such results could not be obtained in any other place than Bellevue or under the conditions that obtain there. Of course the amount of material is very great there and I have no criticism with the plan of treatment. I know it will give satisfactory results, if the treatment is prolonged and the patient is carefully watched, and the condition kept under control by caustics or the actual cautery or dyes for cleaning up the cervix, and the general hygiene directed along proper lines. In many of these cases which were operated upon, if treatment had been prolonged, operation might possibly have been avoided.

As to the question of tuberculosis, the reader of the paper suggests a 5 per cent incidence among those treated at Bellevue. I went over a series of 600 tubes and found 6 per cent tuberculous. In many there was no evidence on macroscopic examination, but tuberculosis was found on microscopical examination. As to treatment of pelvic tuberculosis, in cases in which the diagnosis is made on opening the abdomen, in which there are adhesions in the pelvis and intestinal adhesions, and where the tuberculosis is of severe type, it is best that these cases be left without surgical interference. When one finds such a condition, it often requires more courage to close the abdomen than to proceed with operation. On the other hand, in such cases requiring considerable interference, the result is often an intestinal fistula. Unless there has been a long freedom from fever, the absolute indications are for letting these cases alone, or not operating until the fever has subsided.

DR. H. N. VINEBERG.—Are we compelled to wait? Is there no way by which we can avoid recurrences until the time is reached when radical operation has to be done? It is a sad commentary on gynecology that we have these patients in bed weeks and months and yet they are not cured and finally have to come to a radical

operation. With improved methods there should be a way of preventing these cases from becoming so diseased that complete hysterectomy has to be done. When a puerperal exudate exists with fever and there is a subsidence of the fever for a few days or longer and then there is a recurrence of this fever, you may be sure that you have a pus focus and you may go for it as soon as is convenient.

As to hysterectomy, where the adnexa have to be removed, if I understood correctly Dr. Holladay said that only when the cervix is diseased he removes it. I think that the cervix should be removed when there is such extensive disease that hysterectomy has to be performed and the uterus and adnexa have to be removed. In such cases one should take out the cervix because this gives better drainage. I never suture the skin when there is pus in the abdomen, I just bring it together with adhesive strips and leave in a gauze drain, and it is surprising the number of cases that heal up primarily when treated in this way. If one sutures the skin he very frequently gets stitch abscesses.

I am surprised at the figures on tuberculosis of the adnexa. It is my experience that rather rarely the uterus is involved. So far as my experience goes such a radical operation in tuberculosis is unnecessary. I only remove the pyosalpinx if it is on one side; I have done this in cases where the patients have lived fifteen or twenty years without recurrence. The tuberculosis of the tubes is usually unilateral and where one finds a tuberculous pyosalpinx without involvement of the peritoneum I think it is entirely unnecessary to remove the uterus or the adnexa on the opposite side. Of course it is different when there exists a pretty general involvement of the peritoneum. In these cases it is rare that the tubes form distinct pyosalpinges.

DR. ROBERT L. DICKINSON.—I draw attention to the low mortality that Dr. Holladay has reported and I can explain that mortality having seen his service operate. You must remember that the service at Bellevue gets a rotten type of cases and that there are many prostitutes; it is not a simple class of cases to handle, and to get a mortality as low as the men on that service get is very creditable. The reason they get this low mortality is because they do not crowd yards of dry goods into the pelvis to sandpaper the peritoneum to wall off for pus, and they do a minimum hauling and mauling of the tissues. They have learned that much of the pus is sterile. They know just the point in the culdesac where the pus is going to break out, if it does break out, and watch that point. That is the reason their results are as excellent as they are.

With reference to the paper which reviewed the pathology—Were those frequently recurring cases, the ones that have attack after attack, and that keep recurring? Are those attacks reinfections, gonorrheal ascending infections, or are they mixed infections? Are most of these recurrent cases streptococcus infections? Has Mt. Sinai enough cases cultured to make a statement of the difference in the mortality between gonococcus and streptococcus pus tube operations?

DR. A. J. RONGY.—In 1906 I wrote a paper, entitled "The Conservative Method of Treatment of Pelvic Infection," which was published in the *International Journal of Surgery*. I have had no reason to change my views on the subject since then, and I fully agree with all Dr. Holladay said tonight.

I failed to note whether the mortality statistics included the nonoperative group of patients. Some of these patients are brought to the hospital in a moribund state, beyond surgical or medical help, and it is really unfair to include such patients in our statistics.

I believe that a great number of cases of pelvic infection are due to induced criminal abortions. If we wish to reduce the number of pelvic infections in New York, it behooves those men on hospital staffs not to treat lightly the criminal

abortions, induced by physicians and midwives. Abortions are too often protected by the doctors on hospital staffs. It is probable that 50 per cent of pelvic infections would not occur, if it were not so easy for the average woman to procure the services of a criminal abortionist in this city.

At the same time I feel that the present medical indications for the induction of abortion should be revised, as they did not keep pace with the progress that medicine has made in the past twenty years.

DR. WILLIAM P. HEALY.—When I have been able to recognize a definitely infected ovary, I find it will not clear up without operation. The sooner such a condition is taken care of the better, if the general infection has subsided.

DR. MAURICE O. HAGID.—What has impressed me this evening is that almost everybody spoke of an infected cervix as being the cause of many gynecological troubles and Dr. Vineberg's appeal to the young men to find ways and means so that these cases shall not come to the operating table for hysterectomy. If we studied our cases and took the proper care of the cervixes, we would avoid many hysterectomies. Pathologists have shown us that the diseased cervix is fundamentally the cause of many conditions other than those present in the cervix itself. I was sorry to hear Dr. Strobell refer to Dr. Sturmdorf's tracheloplastic operation as an amputation of the cervix. This operation is not an amputation. I have followed it for ten years and have seen many patients delivered who have had this operation performed. I cannot see, when we have this surgical procedure, without any danger, why we should seek other methods and other operations for the cure of chronic endocervicitis. Dr. Holladay spoke of a modified Sturmdorf. I should like to know what kind of a modification he referred to, for, after all, the fundamental principle of this tracheloplastic operation is to enucleate the infected mucosa without disturbing the muscular mechanism of the cervix and to reline the raw cervical canal with healthy vaginal mucosa, thus giving the woman a chance to bear healthy children without impairing the function of the cervix. Dr. Strobell has not told us whether the use of caustic in his procedure results in functional impairment of the cervix or not. He states that he has used the procedure one hundred times but has not told us whether these women have since borne children. Dr. Strobell emphasized that he removes the focus of infection. So do we, but in a much shorter time and without danger of forming scar tissue in the cervical canal, which may interfere at the time of childbirth.

DR. HOLLADAY, (closing).—In reply to Dr. Brettauer's remark that he was surprised at the relative number that came to operation and as to how conservative we were in that number, I might say that a fairly good percentage of the cases operated upon had a fibroid condition complicating the salpingitis or other pelvic infection. The fibroids were present but the infection giving symptoms was what brought them to the hospital and they were operated on when in condition. On the other hand, I think that possibly he may not have been able to keep his patients in bed long enough for the infection to subside sufficiently. They may have been allowed or went home too quickly so that there is danger that when they return and have to have an operation something more radical has to be done because the disease has progressed so far. We have tried to be conservative and have had patients go out and return three or four times before they received operation.

In the badly matted up tuberculous cases to which Dr. Studdiford has referred we would remove nothing either if it looks as if the intestine might be injured with danger of a fistula resulting. This is a condition that is not to be borne lightly and we seek to avoid its occurrence.

Dr. Vineberg remarked that if he does a hysterectomy he makes it a complete one.

On our service there are a number of different operators and we do not make a practice of doing the complete operation in the hysterectomy cases on account of the slight increase in the risk. In some cases we clean up the cervix with cautery beforehand so that we do not have a diseased cervix when we come to the operation. In other cases we remove the cervix below at operation and decide when we get in above whether hysterectomy is indicated. In this way we do not burn our bridges behind us and have to do the complete operation if the uterus has to be removed. I shall not attempt to put the number of our tuberculous cases against Dr. Vineberg's cases for he has seen many more cases. I have given statistics from the literature and not my own.

With reference to Dr. Rongy's question as to the nonoperative mortality; that was shown in Chart 1. It was 1.6 per cent including both the operative and nonoperative mortality. I did not separate the operative from the nonoperative in estimating the mortality rate. We do not protect the midwives or doctors in abortion cases. Every case of abortion is reported to the Board of Health. To bear witness to this fact if you come to Bellevue you will always find a policeman sitting on the job.

As to the question of what was meant by the modified Sturmdorf operation, I believe that if you are going to call an operation the Sturmdorf operation, it should be done just as he does it, and if not, it should not be called his operation. We put an additional suture on either side to control bleeding. We do not call it a Sturmdorf operation because we do not do it as he does.

DR. KROSS, (closing).—In answer to Dr. Dickinson's question in regard to the cases with repeated attacks, I would say that the infection spreads by the lymphatics and becomes periuterine and peritubal, reaching the peritoneum in this fashion when the tubes are closed; when they are open the infection spreads along the mucosa and, on reaching the fimbriated extremity of the tube, spills over into the peritoneum. In a fairly large series of animals I produced in one-half a general septicemia and in the other half a general peritonitis. I then treated one-half of them conservatively and the other half were given protein injections. I found that the animals that received the protein injections had a much shorter duration of life and a larger number succumbed. In addition there were two cases recently reported in the literature in which the patients had an anaphylactic death. So on the basis of experimental knowledge and of these two cases I think it is wise to proceed carefully with protein injection.

THE NEW YORK OBSTETRICAL SOCIETY

MEETING OF MAY 8, 1923

DR. RALPH H. POMEROY IN THE CHAIR

DR. ROBERT L. DICKINSON presented a **Brief Review of the 1923 Report on Prostitution by the American Committee of Fourteen.**

The renewed interest in social problems on the part of our Obstetrical Society leads one to present a statement of real progress in a matter in which we often despair of progress.

The Committee of Fourteen was organized in 1905 to secure the suppression of the disorderly resorts known as Raines Law Hotels. To fit the Raines Law a few rooms were added to saloons for the purpose of classing the saloon as a

hotel, then these accommodations were worked to bring in profit by leasing a room more than once in a single evening. The Committee effected the suppression of these hotels and of many disorderly resorts, and this was done largely by securing cooperation with the brewers who financed the saloons and with the Surety companies that bonded them, through an appeal to the big brewers and to the directors not to give aid, by their "hotels," to commercialized prostitution. The Committee has been instrumental in securing amendments of the Tenement House Law, making it more effective against the owner as well as the prostitute and her exploiter. The Committee has also contributed to the suppression of prostitution by close observation of court proceedings, bringing the results to the attention of the judges and thereby enabling them to do more successful work. Combined effort, official and volunteer, against prostitution has produced noticeable results. This report maintains that New York has less open vice than any other of the world's largest cities.

Since the recent changes in licensed traffic in liquor the Committee's staff no longer is occupied with investigations of saloons and hotels. Its intensive study has now been turned toward the proceedings in the Woman's Court. This court has become of no little importance in the efforts to suppress prostitution. The large assignation hotels have been closed by progressive police action. A case in point was the notorious resort on East 14th Street run by the ex-pugilist Tom Sharkey. His conviction and prison sentence closed the place.

The work of the Committee is done in cooperation with the police. The difficulties connected are many. Owing to the disagreeable nature of the work reliable new police officers are not easy to secure. New ones are constantly needed, for officers so employed soon become known to the older law breakers, and hence are unable to secure evidence. New men lack the experience to secure efficient evidence against clever offenders. Again, since the closing of the saloons, always centers of information, evidence is less easy to obtain. The same difficulties affect the members of the staff of the Committee of Fourteen.

The Committee believes that the customer as well as the prostitute should be punishable as a vagrant, but no satisfactory amendment of the law or solution of this problem has yet been drafted.

The general closing of assignation hotels has been mentioned, but some hotels still need careful watching and a few arrests of women in hotels are still made. The furnished room house, the apartment house and the taxi are the problems on which more intensive work is being done. No claim is made that commercialized prostitution has ceased to be a serious social problem. The venereal disease reports are evidence enough. Though less venereal disease than tuberculosis is reported by the Health Department, it is believed that the proportion of the former unreported is many times more than the incidence of the latter.

A stricter supervision of dance halls, theaters and other places of public resorts would aid, but the American public is now in the throes of the greatest paternalistic governmental effort to regulate individual life that has ever been attempted and further attempts at regulation, unless of undisputed need, cannot anticipate favorable consideration. The long sought buildings for a Woman's Court and House of Detention will be a landmark of progress. For these the funds have been appropriated.

The main feature of the 1923 report is a study of recidivism. Prostitutes convicted in New York City have had their finger-prints taken since September, 1910. This sure identification permits reconvictions to be studied. It is the comparison between the numbers of first and repeated sentencees that gives point to this study. The report covers 8,152 convictions.

First offenders never reconvicted constitute	82.2 per cent
"Casuals" reconvicted once some time within five to eleven years, constitute one in eighteen, or	5.5 per cent
Persistent offenders are one in thirty-seven, or	2.8 per cent
A study of probation cases show that of first offenders only one in eleven was reconvicted, or	.85 per cent

Women convicted and sent from the Woman's Court to the reformatory institutions may be detained for three years. The House of the Good Shepherd, the Inwood House, and the House of Mercy report on 925 individuals placed in their care. Among these, the first offenders who were never reconvicted constitute 80 per cent. Of those not first offenders who were never recommitted we found 70 per cent. The Bedford Reformatory, reporting on 150 cases (members of a group not as promising as those in the other reformatories) show among first offenders 65 per cent never recommitted.

It would seem to be a fair comment on our part that, as far as convictions can prove anything, these results of the work of the courts and the reformatories are far more promising than the literature on this subject would have led us to suppose. The small number of persistent offenders and the large number of those who had been convicted but once stand out in these studies. It will be seen that the figures run very consistently to the effect that four out of five of those convicted for prostitution or sent to reformatories are not again convicted, and that the number of persistent offenders is small—less than 3 per cent. The distressing thing about the figures is the steady supply of new individuals. The hopeful thing is that the police are steady at work and that a group of thoughtful citizens, persistently studying the problem in a broad-minded way do important service to bring about better conditions. This is one of many striking examples of what a power a group without power may be. With no legal standing, but with a will to serve with quiet collection of facts, with argument from the facts, and intelligent suggestion based on their studies, the darkest of all our social problems gets some start toward solution.

DR. ALBERT M. JUDD presented a paper entitled, **Urinary Symptoms in Women Due to Urethral Pathology Only.** (For original article see page 318.)

DISCUSSION

DR. H. D. FURNISS.—I have seen relatively few of the acute gonorrheas of the urethra in the female, and those in a brief space of time, recovered spontaneously. The most troublesome cases are of the chronic type, which I believe are not of gonorrheal origin. In a few cases where there was a tonsillar infection and the tonsils have been removed, I think they have gotten better. I agree with Hunner that possibly they were expressions of a focal infection somewhere else in the body.

Most of the women we get complaining of urinary symptoms have very little to be seen in the bladder. Most of their trouble is located in the urethra or in the trigone, and in those people I have gotten the best results along the line Dr. Judd has advocated; that is, local treatment, but in stronger solutions of silver than he uses (5-10 per cent) and dilatation with the Kohlman thin-branched steel dilator, with a rubber cover. A dilatation of 35-French is usually sufficient.

A number of these women have very peculiar symptom-complexes; that is, they

complain of a condition which we might call urethral crises once or twice a day or once or twice a week, marked by sudden acute pain in the urethra, which lasts an hour or two and spontaneously disappears. It does not seem to be dependent on anything in the way of diet or exercise or drinking. In two or three patients there were small urethral diverticula, probably the result of perforating urethral abscesses opening in the urethra and leaving a little pocket afterwards. In attempting to dissect them out you may injure the sphincter of the bladder. Recently I had one where we were able to get a rather exact picture of a diverticulum seen through an endoscope, by radiographing the patient with a dental film in the vagina, after filling the urethra with sodium iodide. There was a little pocket in the urethra with a small diverticulum about the size of the end of your finger on the side.

DR. W. P. HEALY.—I had an interesting experience with a case two or three years ago with a very intense trigonitis and irritative inflammation of the upper end of the urethra, just at the vesical sphincter. It was only partially helped by local treatment and was completely cured by colonic irrigations. A year later with a recurrence of her attack she was cured without any local treatment whatsoever, by colonic irrigations, so that really bears out Dr. Hunner's and Dr. Furniss' suggestion that some of these cases of local bladder irritative conditions are secondary to focal infections elsewhere in the body.

DR. W. A. JEWETT.—I would like to ask Dr. Judd if he can give us any idea of the frequency of stricture in the female urethra, and also the most probable location. It may have been because I have been careless in observing the condition, but, personally, my only experience with the difficulty has been at the external os of the urethra.

I would also like to take a little exception to Dr. Judd's statement that the female urethra, particularly its upper end, is the same as the male urethra. We have no ejaculatory ducts or prostate in the female. We have the vesical neck surrounded by the cut-off muscle which comes down as a funnel in the straight urethra, and it seems to me that the conditions are not the same as in the male. In other words one would expect to get, instead of what the genitourinary surgeons speak of as a posterior urethritis, an inflammatory process of the vesical neck, just within the cut-off muscle, or anterior urethra, in those cases.

DR. ALBERT M. JUDD.—I find that the best instrument is the old Valentine endoscope. It is equipped with a globe on the bottom and there is no obstruction so that one is perfectly free to work through the lumen of the tube. The more modern instruments are made with the light taking up part of the lumen of the tube.

I agree with Dr. Jewett perfectly. Of course, we cannot have the same pathology in so far as we do not have the prostatic portion of the urethra in the female, neither do we have the same pathology in the male because we do not have the uterus, tubes and ovaries.

Regarding the question of frequency of stricture, I cannot give you any figures, but it is found very much more frequently than people have any idea of. I see at least two stricture cases in the office every week.

The calibration of the female urethra I do not believe has ever been worked out perfectly.

I do not see why colonic irrigations should not cure urethral conditions in case the primary infection is from that source.

The urethral crises which Dr. Furniss spoke of I feel come a good many times from the fact that Skene's glands become filled up, cause pain, then discharge and the pain is relieved.

DR. PAUL T. HARPER presented a paper entitled **The Utility of Digital Dilatation of the Cervix.** (For original article see page 315.)

DISCUSSION

DR. JOHN O. POLAK.—I had supposed until I came here tonight that digital dilatation of the cervix was only of historical interest for it is not practiced much in this city. The longer I practice obstetrics the fewer cases do we find that need to be expedited in that manner. Notwithstanding my appreciation of Dr. Harper's ability, I still doubt that Dr. Harper fails to traumatize the cervix by digital dilatation, even under complete anesthesia.

We have for a long time given up all digital manipulations within the cervix. We find that even bags give trouble, and in the case of these cervices that the doctor speaks of, and particularly the primiparous cervix, as I have seen them, I cannot quite understand how he succeeds in getting his dilatation so effectively by digital methods, even with complete anesthesia. I cannot see in cases of pre-eclamptic toxemia the need for this expediency. Certainly the results in our eclamptic cases are far better when treated expectantly than when we use expeditious methods of delivery, the accepted plan is to treat the toxemias and allow labor to progress normally. This is borne out in an excellent series quoted to us very recently by Williams. In the first 12 years of the service at Johns Hopkins the mortality was 25 per cent with operative intervention, and in the last series of 10 years when they relied on binding and morphine their mortality was reduced to 12 per cent. It is also borne out in the work done in the Lying-In Hospital and in practically all the hospitals here in this city, and while I feel that Dr. Harper has something that he personally can do, I think it is bad teaching to bring back something that we have passed on to history and re-introduce it into obstetrics so that it can be used by those who are not so well trained.

DR. J. MILTON MABBOTT.—I will just cite two deliveries by the method mentioned in one patient, a primipara and a secundipara,—in toxemia incidental to chronic Bright's disease from which the woman had suffered before delivery, and in fact before marriage. We come down to the third delivery, the second patient, a Roman Catholic, the mother of four living children, who had practiced birth control, perhaps by the only proper method, namely, that of abstinence from intercourse, and having in her fourth pregnancy been the victim of a very severe toxemia which had included a partial blindness, was warned against further child-bearing, having been told by an ophthalmologist that a future condition similar to the past probably would result in permanent blindness. Nevertheless when her youngest child was eight years of age, pregnancy again occurred. She declined, on the recurrence of the toxemia of pregnancy with a great amount of albumin, casts, and somewhat scanty secretion of urine, to have any method of interference with the progress of the pregnancy until we were assured she might be delivered of a living child, and, in fact, until her own life and vision were in danger. I permitted her to go on until she was afflicted with a convulsion. She was then in the eighth month of pregnancy. I have gotten a valuable point from Dr. Harper tonight. I did not realize the necessity of full anesthesia before beginning dilatation. But we soon pressed our anesthetic to the full surgical degree and I remember distinctly that although after a rather long interval since the birth of the last child, the cervix did not dilate easily, nevertheless the whole procedure, at the end of a version by which I delivered this child, had occupied from the time I introduced my fingers, followed by the introduction of my hand into the vagina, one hour and forty minutes. The mother made an uneventful recovery, the toxemia disappeared, the kidneys and eyesight returned to normal.

DR. HAROLD BAILEY.—I have had some experience with both the Haris and the Edgar method of manual dilatation twelve or fourteen years ago, and these cases were always dilated under deep ether anesthesia.

Now, as a matter of fact, it seems to me you cannot produce anything resembling full dilatation by either one or the other of those methods, and I think perhaps we misunderstood the speaker. I think perhaps he intimated that he ended the delivery each time by vaginal cesarean section. At any rate, it seems to me that it is absolutely impossible to obtain anything resembling what is normally considered full dilatation of the cervix by these procedures. As a result of my study of these cases that had this procedure applied—the outcome of which was a paper on shock in eclampsia, I was able to show that these cases went through the most severe shock with a very marked drop in blood pressure, in many instances of 100 millimeters of mercury, and we, of course, with every one else changed our tactics about a dozen years ago.

DR. ASA B. DAVIS.—Dr. Bailey has touched upon a point which coincides with my experience; namely, that it is impossible to secure full dilatation of the cervix by digital force. It is possible to carry such dilatation to a point which will admit the fist doubled to its largest size but this does not mean complete dilatation nor does it allow room for the passage of the fetal head or breech. Many of the stillbirths, birth injuries, and lacerations of the cervix are due to forcible delivery by forceps or version through an incompletely dilated cervix.

It has been my fortune to witness the various methods of forcible delivery practiced on a rather large scale in an experience covering a considerable number of years. There was a time when it was considered imperative to deliver the convulsive toxemias with the least possible delay. Fortunately, such cases have largely disappeared and our ideas concerning the treatment of the few cases which we now see have been radically revised, to the great advantage of mother and child.

At one time accouchement forcé was believed to be the best method to follow. Digital dilatation soon became laceration, until it could be carried no further. This was followed by forcible delivery which extended the laceration in too many cases; so that large vessels were torn open, uterine and vaginal packing was relied upon, but was rarely efficient; with the result that a considerable number of these cases died from hemorrhage plus the toxemia, but largely from hemorrhage. This was true of Dührssen incisions, and following the use of the Bossi dilator. With the conception of toxemia and its treatment as understood at that time, delivery by cesarean section was a decided improvement. In very rare instances this method of delivery still has its place in the treatment of eclampsia.

It is conceivable that by the use of light anesthesia for a short time, with repeated digital dilatation, allowing the patient to come out from the influence of the anesthesia and complete the dilatation by her own forces, in carefully watched and well selected cases, this method can be of value.

DR. CHARLES G. CHILD, JR.—I would like to say a word voicing what Dr. Polak has said about the few cases in which it is necessary to expedite labor today under such conditions, and, furthermore, I desire to state my preference for the firm belief that mechanical dilatation by some such instrument as the Higgins dilator is far superior to any form of manual dilatation.

The Higgins dilator has five blades, and was devised some time after the Bossi instrument, to which I feel it is preferable. The five blades come together as compactly as the two blades of the Sim's dilator, which is a distinct advantage when beginning dilatation in a primiparous cervix with a small internal os. When the

dilatation has progressed to about one inch, the instrument is removed, and over the ends of the blades are fitted flanged finger tips that impinge above the internal os, preventing the instrument from slipping out as the dilatation progresses. The blades are separated by the action of a wheel, so that the dilatation can be made slowly, with little danger of tearing the cervix. In this way nature's method of dilating the cervix, i. e., by intermittent pressure, can be closely imitated. With this instrument the cervix during the latter months of pregnancy can frequently be run up to full dilatation in an hour or two without any laceration, and at the end of the dilatation the cervix is thoroughly paralyzed and offers no subsequent obstruction, a great advantage in cases where version is to be performed. In manual dilatation there is greater danger of laceration, paralyzation of the cervix is seldom accomplished, and the fingers are often so paralyzed themselves by the severe and unusual muscular exercise that any intrauterine manipulation with them later is rendered extremely difficult.

DR. RALPH H. POMEROY.—I wonder if there is not a small field for intelligent fingers in the cervix somewhere between the stage of one finger, where you can just touch the skin, to which the doctor refers, and the stage of complete obliteration of the cervix through which we expect to be able to accomplish a forced delivery without added traumatism. Neither condition can be attained by hand dilatation.

The matter is not altogether undebatable, and we must never lose sight of the fact that there is a sane and physiologic justification for the traumatism of the cervix. The cervix is devoted to being traumatized, even in spontaneous labor. It is torn, it is crushed, it is mutilated by the very forces of the uterus itself, and while most of us accept the proposition that cutting is better than tearing, we are not quite sure what the nature of the distention, dilatation, retraction, and disappearance of the cervix is in normal labor. At least, I am quite sure that Dr. Harper knows more what is going on in that resisting cervical rim than any mechanical dilator that has ever been contrived. Perhaps there is a little field and Dr. Harper is ready to defend himself.

DR. PAUL T. HARPER (closing).—In presenting this subject I assure you it was not my intention to advocate anything that even savors of the radical in operative procedures.

Repeated references in the discussion to forcible dilatation and damage to maternal soft parts make it apparent that the proposition as stated has not been understood. This and our Chairman's remarks prompt me to repeat that digital dilatation of the cervix has been offered as a method of *first-stage* treatment, the field for which is admittedly limited. *Accouchement forcé* as commonly understood was characterized as "in disrepute" and discussion relative to it seems far from the point.

In answer to Dr. Bailey's question I may say that all cases upon which digital dilatation is practiced early in labor are certainly not delivered by vaginal cesarean section. No mention of the method of ultimate delivery was made other than reference to the fact that "in suitable cases, met at or near the seventh month, properly conducted digital dilatation can almost invariably be carried to a point where immediate vaginal section can be done."

I cannot subscribe to the proposition, stated I believe by Dr. Polak, that cases of progressing toxemia and eclampsia go into labor spontaneously and progress toward uneventful delivery so often that operative interference is rarely required. The latter is very often demanded if a reasonable margin of safety is to be accorded mother and child.

I agree with Dr. Davis that frequency of toxemia and eclampsia is decreasing and that each, eclampsia in particular, is a highly preventable complication of pregnancy; but the business of prophylaxis, for reasons that are apparent, is as yet by no means 100 per cent efficient and provision for meeting cases of the kind must be made.

In fulminating cases of toxemia and especially in cases of eclampsia, where intelligent eliminative treatment is being carried on and cure or spontaneous labor is not promising, it is imperative that conservative measures that will bring about emptying of the uterus be instituted at once.

Use of the "bag" is a conservative measure but it is far from wholly efficient as a dilator. On occasion it produces little response and less dilatation: but little less often it occasions uterine overaction and progress in dilatation is obstructed. Digital dilatation is offered as a substitute for the bag in cases where the element of time to be consumed in labor is important. With all muscular tone completely removed by deep anesthesia, digital dilatation is as safe and is far more rapid than hydrostatic; and I attempted to show why the intelligent finger is more efficient as a dilator than the purely mechanical elastic bag.

It is in the rare toxic case that is doing poorly, that is not in labor but should be, that digital dilatation, possibly repeated two or three times, promises most. It hastens the business of emptying the uterus when such a procedure is highly desirable, and cervical and lower segment lacerations do not result *when anesthesia is complete* and the procedure is carried out skillfully.

In reply to Dr. Pomeroy's suggestion that a bag would seem preferable to digital dilatation in cases of premature, dry labor, where the readily compressible and easily injured head has been driven well into an incompletely dilated and firm but thin external os, I will say that introduction of a hydrostatic dilator in cases of the kind is difficult and often impossible when dilatation has well advanced. Careful digital dilatation under ether removes undesirable pressure from the head hastens delivery and leaves the cervix intact.

Finally, I repeat that digital dilatation under ether, far from being advocated as a routine procedure, is indicated in a small number of cases where maximum speed in delivery consistent with safety is called for, and it is so employed by us. We respect the integrity of the cervix and lower uterine segment, and records of postpartum examinations made on patients accorded the treatment show no increase in cervical laceration because of it.

Department of Reviews and Abstracts

CONDUCTED BY HUGO EHRENFEST, M.D., ASSOCIATE EDITOR

Collective Review

New Books

BY ROBERT T. FRANK, A.M., M.D., F.A.C.S. DENVER, COLO.

BY what method medical publishers select the manuscripts which they publish must ever remain a mystery to the uninitiated. Doubtless appeal to a wide audience and the likelihood of a prolonged demand play no small rôle. From decade to decade the type of book changes and only the fewest treatises or monographs preserve their appeal.

The first book to be considered in this review, is one that deals with every system in the body except that of the female genital tract, and yet I do not hesitate to recommend it most highly to every gynecologist and obstetrician.

It is a sign of the times that a book of this character is selected for translation and that a publisher for it can be found. Even the lay public is coming to know that mere manual dexterity does not make a good surgeon. Pathology is receiving increasing attention and Pathological Physiology¹ is constantly growing in importance. Those readers who insist upon direct applicability of their reading to so-called "practical problems" will find that Rost's book fulfills even that criterion. For example the supposed causation of such important lesions as ulcer of the stomach, fat necrosis, gall stones, etc., are thoroughly discussed; the serious results from absorption after intestinal obstruction, blocking of the portal vein, sepsis from peritonitis will be found in its pages. The literature, especially the continental sources, are freely quoted. By judicious interpolations the translator has added the more important American contributions.

The thoughtful reader will be impressed by the fact of the immense number of, as yet undecided, problems and of the importance credited by the author to the nervous system.

This book should prove an exhaustless mine for those seeking new viewpoints, and a stimulus to the surgeon who is interested in functional restoration.

Another book, though neither strictly gynecological nor obstetrical, is, however, of utmost importance to the members of both these specialties.

The incidence of premature birth is great; the mortality of these infants is appalling. Proper prenatal care and facilities for safeguarding the premature infant after birth are necessary.

¹The Pathological Physiology or Surgical Disease. A Basis for Diagnosis and Treatment of Surgical Affections. By Professor DR. FRANZ ROST, University of Heidelberg. Authorized Translation by Stanley P. Reimann, M.D. With a Foreword by John B. Denver, M.D., LL.D., Sc.D., F.A.C.S. P. Blakiston's Son & Co., Philadelphia.

Hess² divides his monograph on premature and congenitally diseased infants into four main parts, dealing respectively with: (1) the etiology, physiology and pathology; (2) nursing and feeding care; (3) general diseases such as gastrointestinal, respiratory, sepsis, syphilis and diseases peculiar to the premature; and (4) the outlook for the premature.

Prematurity implies birth at least three weeks before term, but weaklings and the congenitally diseased or debilitated are hard to exclude from the discussion.

Part I contains a wealth of well arranged material partly collected from the literature and partly from the author's records. The characteristics of the various organs at different stages of development are particularly valuable.

In Part II every detail is described with minute care. Breast milk is advised in every instance, but if this is unobtainable simple formulae for modifying cow's milk are given. The heated bed is given preference over the closed type of incubator.

In severe instances of stridor thymicus one or two treatments with Roentgen rays are advised. Premature infants with atelectases do not respond well to mechanical stimulation. Of the premature born with signs of active syphilis almost all die. Hess advises that the placenta be examined histologically for signs of syphilis. The reviewer feels that such examination is too uncertain to be of much value unless strikingly positive results are obtained. Even twins may show a positive Wassermann reaction in one and a negative reaction in the other. In nearly 50 per cent of syphilitic infants the Wassermann reaction does not become positive before the third month of extrauterine life. Of diseases peculiar to the premature, rickets, anemia and spasmophilia are described.

In arriving at a prognosis it is well to remember that few infants under 27 weeks survive; also within limits, that a small older child has a better chance of living than a younger one that weighs more. If the newborn cries, stays awake and shows vigorous movements the outlook is good. Famous prematures include Newton, Rousseau, Voltaire, Cuvier, Victor Hugo, Lamartine and Renan.

The book is well illustrated and contains a wealth of interesting topics valuable to the pediatrician and obstetrician.

Schröder's textbook of gynecology³ is of unusual interest from several points of view. Schröder is one of the most promising of the younger group of gynecologists. He has done exceptionally good work in connection with the study of the menstrual cycle, having demonstrated that the "functional" layer of the endometrium is cast off with each bleeding. In this book we are able to see that his laboratory training has not unfitted him for clinical activity.

The book of 662 pages of large format, contains 324 illustrations, of which those not photomicrographs were drawn by the author's wife. The arrangement, in conformity with modern tendencies, is according

²Premature and Congenitally Diseased Infants. By JULIUS H. HESS, M.D., Professor and Head of the Division of Pediatrics, University of Illinois College of Medicine; etc., etc. Member of Advisory Board Children's Bureau, Department of Labor, Washington, D. C. Illustrated with 189 Engravings. Philadelphia and New York: Lea & Febiger, 1922.

³Lehrbuch der Gynäkologie. Für Studierende und Ärzte, von Dr. Med. ROBERT SCHRÖDER, ord. Professor für Geburtshilfe und Gynäkologie und Direktor der Universitäts-Frauenklinik in Kiel. Mit 324 farbigen Abbildungen im Text und 3 farbigem Tafeln. Leipzig, 1922, Verlag von F. C. W. Vogel.

to systems, not organs. The anatomy and physiology are most adequately dealt with. Then anomalies of the menstrual cycle are treated in a masterly fashion. The author places ovulation on the 14th to 16th day after onset of the last menses, and considers "*Mittelschmerz*" as an effect of the rupture of the follicle. Like most objectively trained physicians he ascribes little or no efficacy to the ovarian extracts on the market.

The changes of position of the uterus, including prolapse, are somewhat summarily treated. Antelexion is discussed as a malposition. All inflammations of the genitals are considered in Chapter V, and peritonitis is here likewise discussed. The number of proprietary chemical preparations mentioned under the treatment of gonorrhea is quite amazing.

Chapter VI deals with foreign bodies, injuries, cicatrices, hematoma and hematocele. This arrangement separates perineal tears from prolapse of the uterus, in connection with which they logically should be discussed. An excellent chapter on malformation follows. Cysts of the genitals, this signifies retention cysts only, appear quite isolated and disconnected in a separate chapter.

The chapter which deals with all tumors of the genital tract occupies 160 pages. The histology of neoplasms is well presented and illustrated. The prognosis of, and the method of dealing with, ovarian tumors is most inadequately presented. Schröder has heard of only 40 to 50 cases of carcinoma developing in the cervical stump though Polak collected close to 250 from the American literature alone.

This brings up the point that, as far as Schröder is concerned, America still waits to be discovered. I find Cullen's name once casually mentioned, but if any other American author has been quoted I have missed the citation. Occasionally an English or French name crops up.

Operative technic is not discussed. The type of operation, however, is clearly indicated. Conservative measures are described in more detail. The author's therapy is admirably conservative. The book may be regarded as a good example of the views and tendencies of the younger school of German gynecologists who show a return to conservative trends and who are willing to turn to immunology, radiotherapy and "medical" measures as aids or even substitutes for the scalpel.

Slightly disguised, under a Spanish cloak, but yet characteristic, appears a good translation of the 16th edition of Karl Schröder's *Gynecology* edited by Hofmeier of Würzburg.⁴ The book is excellently gotten up, well illustrated and brought up to date. The reviewer confesses a distinct fondness for the references in the form of footnotes, as carried out in this edition. The modern way of bunching all the literature at the end of a book, not even according a separate line to each reference, is economical—but nasty.

Another Spanish translation is that of Fabre's (Lyons, France) *Manual of Obstetrics*.⁵ This is a small volume of 344 pages based

⁴*Tratado de Ginecología*. Por M. HOFMEIER, Profesor de Obstetricia y Ginecología de la Universidad de Würzburg. Con 297 Figuras en el Texto y 10 Láminas. Casa Editorial P. Salvat Barcelona, 1922.

⁵*Manual de Obstetricia*. Por el PROF. FABRE, de la Clínica Obstétrica de la Facultad de Medicina de Lyon, Miembro correspondiente de la Academia de Medicina. Vol. I, Parte Normal, Tercera Edición, Ilustrada con 238 figuras intercaladas en el texto, Barcelona, 1923. Casa Editorial P. Salvat.

upon the third edition. The illustrations are striking, of the poster type, well calculated to impress the student. Although gloves are advised the accoucheur's hand is pictured without these essentials. Undue emphasis and undue space, considering the elementary character of the book, is accorded to the author's method of registering uterine contractions by means of the metreurynter and tambour. Only normal labor and puerperium are discussed.

Of older date (1920) is an entirely Spanish Obstetrics by Girol,⁶ an imposing volume of 974 pages. Of especial interest are several gross sections of the pregnant uterus at term and in labor and an exceptionally large collection of fetal monstrosities from the medical museum of the Madrid School. The book shows the influence of the best methods of all countries, but shows little evidence of the development of a Spanish school.

From Ireland we have a "Practice of Midwifery" by Gibbon Fitzgibbon,⁷ for three years Master of the Rotunda Hospital in Dublin. This book is disappointing throughout. In his effort to adapt his work to the need of the student, Fitzgibbon has so studiously suppressed his personality and his undoubted knowledge that the text is drab and does not bring out fully the practice current at the Rotunda. We note, without approval, the use of the left lateral posture during delivery and the use of the term "abortion" up to the twelfth week, and of "miscarriage" from the twelfth to twenty-eighth week. The sole point of interest is a cursory report of over 200 cases of eclampsia treated by gastric and colonic lavage, subcutaneous infusion of bicarbonate solution and venesection with a mortality of only 8.87 per cent.

Returning to this side of the Atlantic we take up Plass' "Obstetrics for Nurses."⁸ This both consciously and unconsciously shows the influence of the Johns Hopkins School as exemplified by Whitridge Williams. The book is good, but is too theoretical for nurses. With but slight change and some additions it would prove a useful book for the medical student. We are more and more prone to expect the nurse to know too much and to do too little.

Sellheim's Obstetrical and Gynecological Methods of Examination⁹ is a useful guide to the advanced student or budding specialist. Much of what is usually picked up haphazard or never learned is here presented in an orderly fashion. The book will also prove of use to the teacher. The clear cut line drawings are excellent.

Liepmann's Course on the Obstetrical Phantom¹⁰ is more specialized than the preceding, dealing exclusively with obstetric diagnosis, maneu-

⁶*Tratado de Obstetricia.* Por el Dr. D. SEBASTIAN RECASENS GIROL, Catedrático por oposición de Obstetricia y Ginecología de la Facultad de Medicina de Madrid; Académico de la Real de Medicina; Presidente de la Academia de Obstetricia y Ginecología de Madrid, Cuarta edición, ilustrada con gran número de grabados, Barcelona 1920, Casa Editorial P. Salvat.

⁷*Practical Midwifery.* By GIBBON FITZGIBBON, M.D., B.Ch., B.A.O. (Dub. Univ.), F.R.C.P.I., L. M. Master Rotunda Hospital, Dublin, with 175 illustrations. London, 1923, J. & A. Churchill.

⁸*Obstetrics for Nurses.* By EVERETT DUDLEY PLASS, M.D., Obstetrician-in-chief, Henry Ford Hospital, Detroit; Formerly Associate Professor of Obstetrics in Johns Hopkins Medical School. New York, 1922, D. Appleton & Company.

⁹*Die Geburtshilflich-Gynaekologische Untersuchung.* Ein Leitfaden für Studierende Ärzte von Dr. HUGO SELLHEIM, o.ö. Professor und Direktor der Universitäts-Frauenklinik in Halle a.S. Mit 94 Abbildungen, Vierte, vermehrte und umgearbeitete Auflage, München, 1923, Verlag von J. F. Bergmann.

¹⁰*Der Geburtshilfliche Phantombkurs,* in 165 Federzeichnungen für Ärzte und Studierende, von Dr. Med. WILHELM LIEPMANN, o.ö. Professor für Frauenheilkunde an der Friedrich Wilhelm-Universität in Berlin. Wien, 1922, Urban & Schwarzenberg.

vres and operative methods. It is profusely illustrated with figures showing a resemblance to those of Farabeuf and Varnier.

The "Causation of Fetal Death," by Eardley Holland¹¹ is published by the English Ministry of Health. It deals with 300 fetuses of viable age and summarizes an elaborate and painstaking research. Complications of labor, including antepartum hemorrhage and postmaturity account for 51 per cent of deaths, syphilis for 16 per cent, toxemia 10 per cent. Holland suggests that proper antenatal care and better instruction to the medical student will greatly reduce the mortality.

An old friend, but of undiminished value, cropped up in v. Neugebauer's monograph¹² on twin pregnancies in heterotopic sites, published in 1907. One hundred and sixty-nine cases are recorded. Since that date the literature has contained many additional reports. Even these old statistics contain six cases of ovarian and nine of the interstitial site of one of the ova.

The University of Chicago Press in 1917 published a small monograph by Newman on the "Biology of Twins."¹³ In clear nontechnical language the human twins, the Armadillo twins (two pair from a single ovum in one species, and twins due to fusion of two ova in another species) and the rare freemartin of cattle are discussed. Now (1923) appears a second monograph by the same author on the "Physiology of Twinning."¹⁴ Twinning, according to Newman, requires totipotency of blastomeres. In certain forms, as for example Tunicates, each part of the egg has a prospective value, hence isolation of blastomeres produces merely parts of an individual instead of two individuals. Newman, in opposition to Stoddard, considers double monsters incompletely divided single embryos. The opposite view is that they are two individuals partly fused. The entire animal scale is reviewed for data. The books are of considerable interest to the medical man.

More specialized but of even more far reaching interest is an account by Bresslau,¹⁵ formerly of Strassburg, of the development of the milk gland which characterizes the large group of mammals. The studies were conducted mainly on the material collected by Prof. Semon while on his trip to Australia, material which had already been worked over by Gegenbaur and Klaatsch. Bresslau believes that the *Anlage* of the breast, as appearing in the embryo of celidna, corresponds to the brooding spot noted in certain birds and philogenetically bridges the gap to those ancestors of the mammal who hatched eggs. In the monotremes no nipples are found; in the marsupials these organs are present. In placentalates the breasts, whether a single pair or in multiple,

¹¹The Causation of Foetal Death. By EARDLEY HOLLAND, M.D., F.R.C.S., F.R.C.P., Surgeon at the City of London Maternity Hospital, Assistant Obstetrical Physician at the London Hospital. London, 1922, Published under the Authority of his Majesty's Stationery Office.

¹²Zur Lehre von Der Zwillingschwangerschaft, mit heterotopem Sitz der Früchte. Von Franz Ludwig von Neugebauer. Bibliothek medizinischer Monographien, Band 1, Leipzig, Verlag von Dr. Werner Klinkhardt.

¹³The Biology of Twins (Mammals). By HORATIO HACKETT NEWMAN. The University of Chicago Press, Chicago, Ill.

¹⁴The Physiology of Twinning. By HORATIO HACKETT NEWMAN, Professor of Zoology, University of Chicago. The University of Chicago Press, Chicago, Ill.

¹⁵The Mammary Apparatus of the Mammalia. In the Light of Ontogenesis and Phylogenesis. By ERNEST BRESSLAU, M.D., late Professor of Zoology in the University of Strassburg, with a note by James P. Hill, D.Sc., F.R.S., Jodrell Professor of Zoology, University of London, with 47 Illustrations, London, Methuen & Co. Ltd.

develop along the "milkline," an epidermal ridge extending along the lateral aspect of the trunk analogous to the *Aulage* seen in monotremes and marsupials. There are gaps between all three types, bridged by Huxley's prototheria and metatheria—a fascinating monograph.

The trend toward nonoperative therapeutic measures in gynecology is shown by the little brochure in French on the technic of Thure Brandt. This almost forgotten method is redescribed in glowing terms. The gynecologist will derive profit from its perusal, due allowance being made for the overenthusiasm of its author, Doctoresse Hélène Sosnowska.¹⁶ The gynecologist of today rarely avails himself of this method of massage, most useful in bringing about the absorption of sluggish exudates or to overcome pelvic adhesions.

A further French publication along lines of conservative therapy is the one on Radium in Gynecology by Siredey and Gagey.¹⁷ It is based on 700 cases, but it is to be regretted that the cancer cases have been observed for only two years. Furthermore, today, no such book can pass muster unless Roentgen ray applications to the pelvis are advised to fortify and to complete the treatment by radium.

Teuwirth's¹⁸ short pamphlet praises radium therapy of cancer of the cervix highly. It contains a good résumé of the German literature, but gives no new facts.

In contrast to the foregoing, a French book dealing solely with curettage (indications, technic, accidents and results) is difficult to account for.¹⁹ The reviewer is more and more inclined to relegate the curette to the discard except as a means of diagnosing intrauterine conditions. During the course of exploration, in some instances, curetting at least temporarily relieves bleeding if due to a hyperplastic endometrium. For retained placental tissue, when intervention is necessitated by hemorrhage, the placental forceps should be used. The author, Fiolle, preaches the opposite doctrine and is a fairly active interventionist.

"Obstetrical Tables" by Anderson²⁰ is a quiz compend of the now happily obsolescent type. The booklet must be of use in "cramming" for examinations, otherwise it would not have reached a second edition.

"The Anatomy of the Female Pelvis" by Maguire²¹ fails of being a successful attempt to present this region to the student of gynecology. In connection with the lecture and dissecting room the book may pass, but, adorned by four execrable diagrams, the result is failure, if no anatomical material is available.

Kehrer of Dresden discusses the causes and treatment of sterility

¹⁶*Thérapeutique Gynécologique, Indications et Technique de la Méthode de Brandt, Avec 17 figures dans le texte.* DR. HELENE SOSNOWSKA. Paris, 1922, Gaston Doin, Editeur.

¹⁷*Le Radium en Gynécologie.* Par A. SIREDEY, & JEAN GAGEY. Paris, 1922, "L'Expansion Scientifique Française."

¹⁸*Ersatz der Operation des Gebärmutterkrebses durch die Strahlenbehandlung.* VON MEDIZINALRAT DR. NEUWIRTH. Wien und Leipzig, 1923, Wilhelm Braumüller.

¹⁹*Le Curettage Uterin.* Par J. FIOLE, Professeur à l'école de Médecine de Marseille, Chirurgien des Hôpitaux. 1922, Masson Et Cie Editeurs.

²⁰*Obstetric Tables.* A Guide for Students. By MAURICE C. ANDERSON, L.R.C.P. Ed., Obstetrician, Brixton Hill Maternity Home, Hon. Gynecologist, Brixton Dispensary, Second Edition, London, W. 1. 1923, A. & C. Black, Ltd.

²¹*The Anatomy of the Female Pelvis, Descriptive and Applied.* By F. A. MAGUIRE, Honorary Assistant Gynaecological Surgeon, Royal Prince Alfred Hospital, Sydney; Lecturer and Demonstrator (and Acting-Professor) in Anatomy, University of Sydney, Sydney, 1922, Angus & Robertson Ltd.

in a most interesting fashion.²² He lays great and probably undue stress upon dyspareunia, especially upon psychical dyspareunia as a cause. In his opinion both myomata and cystic ovaries are due to prolonged disturbances of sex life. Therapy, to a large extent, should be directed toward enlightenment of the couple and along psychoanalytic channels. A wealth of information is contained in this short monograph.

The same subject is treated by the Frenchman Batuaud,²³ from a purely mechanistic angle. It follows that his therapy is directed more toward the cure of cervical lesions and to ovotherapy.

A related subject is discussed by Friedjung²⁴ in a small brochure. He suggests that the first sex instruction should be given to children of between 4 and 5 years by their parents, and that fuller details ought to be given between the 11th and 13th year. The question is a burning one, especially in Germany, where the percentage of boys infected with venereal disease has risen tremendously since the war (in the year 1919 in Berlin of all patients 28 per cent were boys).

Presumably for grown ups, because it is "For sale only to members of the Medical Profession" is Van Teslaar's "Sex and The Senses."²⁵ Part I is devoted to dermal stimuli of every variety, including touch, tickle and kiss; their effect symbolically and somatically. Part II deals with autoerotism or masturbation starting with the nursing infant. The view that masturbation *per se* is not necessarily harmful will be shared by every physician of experience. This book will appeal more to professional psychoanalysts than to gynecologists, who, as a class, are usually not readily impressed by "sexological literature."

The preceding two publications form a natural transition to several volumes destined to enlighten the nonmedical public.

Simon's book on "Syphilis"²⁶ is written in nontechnical language for the laity—"for our children when they reach sixteen years" as he says. The exposition is far too detailed, however, for the average reader in whom it is likely to breed morbid fear or to produce ennui. Physicians will find much of interest in its pages.

Lane-Clayton²⁷ has written a readable and instructive book on the hygiene of women and children destined for the enlightenment of the nurse and health visitor. Perusal of its pages throws interesting side-lights upon the backwardness of some of the middle sized old British towns in disposal of refuse and sewage. In regard to rural conditions our own conditions are probably on the same plane as those discussed by the author. The book is sane and worth while.

²²*Ursachen und Behandlung der Unfruchtbarkeit*, nach modernen Gesichtspunkten zugleich ein Beitrag zu den Störungen des Sexuellen Lebens, besonders der Dyspareunie, von Prof. DR. KEHRER, Geheimer Medizinalrat, Direktor der Staatlichen Frauenklinik, Dresden. Mit 4 Tabellen, 13 Kurven und 2 Abbildungen, Dresden und Leipzig, 1922, Verlag von Theodor Steinkopf.

²³*La Sterilité Feminine, Ses Causes son Traitement*, Avec 23 figures dans le texte, DR. JULES BATAUD, Paris, 1922, Gaston Doin, Editeur.

²⁴*Die Geschlechtliche Aufklärung im Erziehungswerke*. Ein Wegweiser für Eltern, Erzieher und Ärzte, von Priv.-Dozent DR. JOSEF K. FRIEDJUNG. Wien und Leipzig, 1922, Verlag von Josef Saffai.

²⁵*Sex and The Senses*. By James S. Van Teslaar (For sale only to Members of the Medical Profession) Boston, Richard G. Badger.

²⁶*La Syphilis*. Avec 41 figures dans le texte, DR. CLÉMENT SIMON. Médecin de l'Infirmière spéciale de Saint-Lazare, Paris, 1922, Ernest Flammarion, Editeur.

²⁷*Hygiene of Women and Children*. By JANET E. LANE-CLAYTON, M.D., D.Sc., (Lond.) Dean and Lecturer on Hygiene in the Household and Social Science Department, King's College for Women; Justice of the Peace; Formerly Medical Inspector Under the Local Government Board. London, Henry Frowde and Holder & Stoughton.

Because of a preconceived prejudice at having to review still another book on the feeding, diet and general care of children the one written by Bell²⁵ proved a most pleasant surprise. It is clearcut, snappy, to the point and most informative. Even the chapters dealing with disease do not arouse the annoyance which attempts to make a diagnostician of the mother usually produce in a physician, because of the tactful way in which this difficult subject is handled. A book worth recommending to mothers.

²⁵**Feeding, Diet and the General Care of Children.** A Book for Mothers and Trained Nurses. By ALBERT J. BELL, A.B., M.D., Assistant Professor of Pediatrics in the Medical Department of the University of Cincinnati; Attending Pediatrician to the Cincinnati General Hospital, The Tuberculosis Hospital and the Christ Hospital; Member of the Medical Milk Commission, and Chairman of the Divisional Council on Child Hygiene, Cincinnati, etc. Illustrated, Philadelphia, 1923, F. A. Davis Company, Publishers.

Selected Abstracts

Syphilis and Tuberculosis in Pregnant Women

Williams, J. Whitridge: Value of the Wassermann Reaction in Obstetrics. Bulletin of the Johns Hopkins Hospital, 1920, xxxi, 141.

In 4000 women delivered during the period under consideration, 449 or 11.2 per cent presented a positive reaction during pregnancy. Its incidence was much greater in the black than in the white women, being 16.29 per cent and 2.48 per cent respectively. In other words, a positive Wassermann was noted in every sixth colored woman as compared with every fortieth white woman. What is the significance of a positive Wassermann reaction occurring in a pregnant woman? Does it mean that she has syphilis, and will she transmit the disease to the child? To the first question, Williams is not prepared to give a conclusive answer; in answer to the second question, he states that it appears conservative to assume that the evidence at his disposal indicates that less than one half of such women, and possibly even a smaller number, will bear syphilitic children. One baby in 100 (43 out of 4000) will have syphilis even when the maternal Wassermann is negative, and, consequently, one is not justified in claiming that the most ideal prenatal care can entirely eradicate the disease as a cause of fetal death. Turning to the consideration of the significance of the fetal Wassermann at the time of delivery, a positive result was obtained in 38 of the 4000 observations, approximately 1 per cent. This means that only a small fraction of the children born of mothers with a positive Wassermann present such a reaction. Macerated children are not available for the test as their blood is already "laked." Reviewing the follow up records of these children, Williams concludes that a positive Wassermann at birth does not necessarily imply that it will remain so; and conversely, that a negative Wassermann at birth does not necessarily mean that it may not become positive later; and that the information obtained by the Wassermann made from the fetal blood at birth is not commensurate with the time consumed, nor the money expended in such investigations.

Williams is convinced from routine microscopic study of the placenta that the syphilitic lesions occurring in it are extremely characteristic and afford more conclusive evidence of the existence of syphilis than the demonstration of the positive maternal Wassermann, and in general tally fairly closely with the autopsy findings in the child. The present study confirms his previous impressions, for the microscopic examinations of the placenta tallied with the clinical and anatomical findings in the child in from 80 to 90 per cent of the cases,

which was in marked contrast to the 40 per cent obtained from a positive maternal Wassermann reaction.

According to Williams, the possibility of spermatie infection and the admissibility of Colles' law have not yet been conclusively proved or disproved and consequently should be regarded as still *sub judice*. C. O. MALAND.

Ross and Wright: The Incidence of Congenital Syphilis Among the Newly Born. Lancet, London, 1921, cc., 321.

The object of this work was to determine the difference in the incidence of congenital syphilis among the newly born in a mining town and in an industrial town. The results were based upon the Wassermann reaction of the placental blood, the specimens being collected by midwives. Each specimen underwent the test in two separate laboratories. In 284 of the 300 blood specimens examined from the mining district the results of the two laboratories were identical, while in 16 cases there was some difference in results or other fault. In ten of the total 300 specimens from the mining district a positive Wassermann reaction was found by both laboratories, or 3.5 per cent.

In the industrial area the number of specimens examined was considerably less, only 40 being obtained. Of these one specimen or 2.5 per cent gave a positive test.

They feel that while the number of blood specimens examined was too small to draw any definite conclusions, yet the number of positive reactions obtained was significant, and calls for further investigation of unselected cases as well as from those where either parent is known to be infected so the reliability of the test may be definitely gauged from the results achieved. Finally they believe that the finding of 3.5 per cent positive results is highly suggestive of the prevalence of apparently undiagnosed syphilis in the general population.

NORMAN F. MILLER.

Willenbacher, F.: The Wassermann and Sachs-Georgi Reactions During Labor. Archiv für Gynäkologie, 1923, cxvi, 558.

Study of these two reactions in the blood of 146 patients in labor has confirmed the presence of a non-specific inhibitor of hemolysis giving a falsely positive Wassermann in labor in a small percentage of cases—3 out of 90, known to be free from syphilis; 8 days later, these three were again negative. In 78 cases the Sachs-Georgi test gave no false positives.

Willenbacher gives a thorough discussion of the mechanism of the Wassermann reaction. RAMSAY SPILLMAN.

Stühmer, A., and Dreyer, K.: The Unreliability of the Serum Reaction for Syphilis in Pregnant and Parturient Women. Zeitschrift für Geburtshilfe und Gynäkologie, 1921, lxxix, 289.

The authors studied the Wassermann reaction in 250 parturient and 37 pregnant women and present the following conclusions:

The serum reactions for syphilis during pregnancy and particularly during parturition are unreliable. In about 10 per cent one has to deal with non-specific inhibitions, sometimes of marked degree.

The retroplacental blood gives the most untrustworthy reactions. Arm vein blood gives better results, but here also a tendency to inhibitions occurs not rarely. Cord blood gives fewer non-specific positive reactions but is not usable since it may give a negative reaction in the presence of definite lues.

The various modifications show varying percentages of error; the precipitation reaction of Sachs-Georgi is the most reliable. The cause of the non-specific reactions may be ascribed to metabolic changes in the liver or placenta. The authors regard the factor of unreliability so great that a serological laboratory in connection with a maternity does not warrant the cost and effort involved.

MARGARET SCHULZE.

Pomini, F.: The Wassermann Reaction on Retroplacental Blood. *Annali di Ostetricia e Ginecologia*, 1922, xliv, 688.

In order to control the work of Krukenberg the author has investigated 100 cases from the standpoint of the Wassermann reaction found in the vein of the arm, in the retroplacental blood, and in the fetal blood from the umbilical vein. He finds that there exists in the retroplacental blood a strong tendency toward a positive reaction, which is influenced by strong uterine contractions, but more especially by the constitution of the placental villi. In luetic patients the retroplacental blood is often more strongly positive than that from the arm, while a negative reaction of the retroplacental blood is indicative either of the absence of syphilis or of a probable cure of the condition if such has existed. Deviation of complement is probably due to lipoids expressed from the placenta by uterine contractions; such lipoids probably are present in all retroplacental blood. The results obtained by the author tend to confirm Krukenberg's finding that the blood from the umbilical vein can be influenced in 5 per cent of cases by adding placental extract.

THOS. R. GOETHALS.

Kilduffe, R. A.: Concerning the Wassermann Test in Its Relation to Pre-Natal and Congenital Syphilis. *American Journal of the Medical Sciences*, 1922, clxiv, 677.

Kilduffe makes a thorough survey of the literature and places the proper interpretation on the work done. Very properly he puts the work of Williams at the head of the list. The follow-up-system used by Williams proved that a Wassermann positive newborn may become negative without treatment, and that a Wassermann negative may become positive within three years. He also points out the unreliability of the Wassermann test during pregnancy, due to lack of refinement in technic and to errors of interpreting the findings.

Most experimenters have used cord blood but they are at variance as to whether a positive Wassermann is indicative of syphilis in the mother only or in both mother and child. The cord blood was used by Kilduffe for his experiments. While his series comprised only 269 cases, the results obtained were in agreement with those of more extensive investigations and show the unreliability of the cord blood Wassermann in determining the presence of syphilis in the newborn. He states that this investigation should be carried to the extent of including blood from both parents, the child at birth and the child in later life.

WM. KERWIN.

Esch, P.: Serum Studies in Syphilis of the Newborn from Healthy and Luetic Mothers, and on the Mother in Latent Congenital Syphilis. *Zentralblatt für Gynäkologie*, 1923, xlvii, 709.

Esch and Wiceloh last year reported 195 investigations of blood from the umbilical vein with two strongly positive, two weak positive, and three doubtful Wassermans, where the mother's blood was negative. Five of these seven mothers had reacted positively at one time or other in pregnancy or the puerperium.

The present communication deals with the results of the investigation of infants with manifest syphilis but negative Wassermanns, and the effect of recent or latent maternal syphilis in modifying conditions. Blood was taken from the arm of the mother and from the cord. Thirty cases were investigated, 12 "fresh" cases and 18 latent cases. In the first group, women who had been treated during pregnancy, only 5 showed a positive reaction at the time of birth, and in these the child's Wassermann was positive four times and negative once. Of the four positive children two were premature, and two showed definite syphilitic symptoms. The child with the negative reaction was apparently sound at birth. In the remaining 7 cases both mother and child remained negative, though two of these children were premature but without evidence of lues. Of the 18 with latent syphilis 10 were positive, and of the children 7 were positive and 3 negative. Nine of the children were clinically sound, one with a positive reaction died on the fourteenth day of visceral lues. Of the remaining 8 both mother and child remained negative, but two of the negative children were premature and one showed pemphigus syphiliticus. The author suggests that blood from the umbilical vein can only give a positive reaction (though it need not do so) if the corresponding mother had a positive reaction. If the maternal blood is negative the fetal blood is also negative, whether the child or mother be syphilitic or not. This investigation shows that study of the fetal blood is useless for the diagnosis or exclusion of latent syphilis of the newborn; furthermore, that a positive Wassermann is not an indication for anti-syphilitic treatment.

Moreover, a positive reaction of the fetal serum does not always mean maternal syphilis. The Wassermann reaction depends on altered lipid metabolism which ordinarily exists in pregnancy. The serum of syphilitic pregnant women and luetic infants must differ biologically otherwise the infants with florid lues could not so frequently show a negative reaction. It is possible that positive reactions in fetal serum are most frequently due to damage of the placenta allowing contamination with maternal blood. The fetal lues is in all probability directly due to spirochetes from the maternal circulation.

One practical point in connection with these suggestions is the importance of tying off the child as soon as born before there is the possibility of mixing of fetal and maternal blood which might occur during the separation of the placenta.

LITTLE.

Widakowich, V.: Concerning Spermatozoa of Syphilitic Individuals. *Le Semana Medica*, (Buenos Aires), 1920, xxvii, 633.

Few data exist concerning the rôle of the spermatozoa in causation of abortions, premature births, and monstrosities so often observed in syphilitic cases. No one has attempted to correlate a hypothetical deterioration of the germ plasma with morphologic alteration of the sexual cells.

Syphilis has a special tendency, among the infections, to be transmitted to the fetus, causing the latter to become "heredo-infected." In the absence of actual transmission of the infection to the product of conception syphilis has the power of causing alterations in the latter, even though it does not actually harbor the *treponema pallidum*, giving rise to an individual who is "heredodystrophic." The author believes that a relationship can be traced between heredodystrophies and various morphologic anomalies found in the spermatozoa of syphilitic for-bears. The occurrence of isolated stigmata, such as Hutchinsonian teeth, in heredodystrophic offspring of healthy mothers seem to indicate that the maternal sex cell is not a factor in the case, as well as that the direct action of the spirochete is not to be held accountable.

The author has employed spermatodiagnosis in connection with the Wassermann in several groups of cases;

- A.) 41 known syphilitics. All showed abundant pathologic spermatozoa.
- B.) 35 cases of suspected syphilis, of which
 - a. 17 cases showed positive Wassermann and many abnormal spermatozoa.
 - b. 9 cases showed negative Wassermann and few abnormal spermatozoa.
 - c. 9 cases showed negative Wassermann but many abnormal spermatozoa.
- C.) 9 individuals with healthy children, eliminating one who was alcoholic.
- D.) 16 healthy single individuals.

The abnormal forms of spermatozoa noted were those with 2, 3, or 4 heads, each of these types having one to four tails; giant and dwarf forms; anomalies in size and form of the head, e.g. micro-and amicrocephalies; and anomalies in the pars intermedia and the tail.

	Normal spermatozoa per 1000 counted	Pathologic
Group C.) 8 individuals with healthy children	average 981.4	18.6
Group D.) 16 individuals, healthy, single	average 981.4	18.6
Group Bb.) 9 individuals, neg. Wass.	average 981.0	19.0
Group average 33 healthy individuals,	average 981.3	18.7
Group A.) 8 syphilitics	average 922.2	77.8
Group A.) 33 syphilitics	average 949.0	51.0
Group Ba.) 17 cases pos. Wassermann	average 945.2	54.8
Group average, 58 syphilitics,	average 944.2	55.8

Of Group Be, the 9 cases with negative Wassermann and abundant pathologic spermatozoa, the majority either gave very suggestive histories, or were much benefited by empiric treatment with mercury.

Of 5 cases of heredosyphilis the author found 68, 100, and 117 per 1000 of pathologic spermatozoa in three. Two alcoholics showed 12 and 18 per 1000 abnormal spermatozoa, respectively. Gonorrheal complications observed by author caused no increase in pathologic forms.

THOS. R. GOETTELS.

Hinton: The Wassermann Reaction in Pregnancy. The American Journal of Syphilis, 1923, vii, 155.

Hinton made a study of the Wassermann reaction in 10,427 pregnant women collected from four institutions. He thinks the results are representative of the average women of the dispensary class in Massachusetts. While the positive reaction varied from 1.57 per cent in one institution to 5.6 per cent in another, the average was 4.18 per cent. Adding to these the doubtful cases, which he considers to represent insufficiently treated cases, he obtains a total incidence of 8.3 per cent of pregnant women with syphilitic taint.

Hinton's extensive experience has led him to the conclusion that properly standardized cholesterinized antigens yield a negligible number of false positive reactions in pregnant women.

R. E. WOBUS.

Shipley, P. G., Pearson, J. W., Weech, A. A., and Greene, C. H.: X-ray Pictures of the Bones in the Diagnosis of Syphilis in the Fetus and in Young Infants. Johns Hopkins Hospital Bulletin, 1921, xxxii, 75.

The authors made a study of 300 white fetuses (listed as normal in the Carnegie Institute of Embryology) ranging in age from the sixth month of intra-

uterine life to nearly term. Of these 25 per cent had marked signs of osteal syphilis and 46 out of the first 100 bodies examined had well marked or suspicious lesions. The most frequently and most severely affected bones are in order of frequency: the lower end of the femur, the distal and proximal ends of the tibia, the distal ends of the radius and ulna, the extremities of the metacarpals, the proximal ends of the phalanges, and the proximal ends of the ulna and radius. Any bone may be involved. "The shadows resulting from syphilitic lesions in early life are due to vagaries in the calcification of the provisional cartilage and to the abnormal arrangement and distribution of the osseous tissue." Endochondreal defect is the most important in the fetal type. Periosteal involvement usually appears after birth. Eleven characteristic x-ray pictures of syphilitic bones in various stages of the disease are shown. The shadows are very well described and explained. Scoury and rickets must be differentiated from osteal syphilis of the fetal type.

C. O. MALAND.

Henrotay, J.: **Fetal Malformations and Syphilis.** *Gynécologie et Obstétrique*, 1922, v, 287.

The author reports two cases of especially interesting malformations. One was a case with a ventral defect with an equino-talus and spina bifida about six and one-half months' gestation. The mother had two infants at term and one premature. Only one was alive. The mother had a positive Wassermann. In the second case the mother had one child 18 years old by a former husband. In the present case there was marked cephalic deformity. The mother had a positive Wassermann; the father was also a syphilitic and had received treatments. The mother had never presented any manifestations of this disease. The author also removed a hydatiform mole from a woman who had a positive Wassermann. There were also two other deformed infants from mothers both of whom had positive Wassermans. He reports in detail a case seen in consultation. The woman had had six pregnancies. The first two babies were born macerated, the second one possibly with a malformation of the head. The third pregnancy resulted in a living infant. The fourth pregnancy was terminated prematurely. The fifth pregnancy resulted in a healthy infant delivered by forceps. The Wassermann was negative at this time. In the sixth pregnancy she was delivered of a child with an eczema. He delivered a sister-in-law of an infant with a cephalic deformity. He also took care of the wife of the brother of the husbands of the preceding two. In these three families syphilis was undoubtedly present though it presented no manifestations. The three brothers probably had hereditary syphilis. The author emphasizes the importance of syphilis in pregnancy and urges obstetricians to investigate carefully for the presence of this disease.

F. L. ADAIR.

Favreaux, M.: **Syphilis and Procreation.** *Journal de Médecine de Bordeaux*, 1921, cvii, 551.

In permitting procreation or marriage in any given case of syphilis one must consider fully the virulence and duration of the infection. In cases treated early, at least one year of treatment and one year of observation with continued negative blood and spinal fluid reactions is required. If the infection is of longer duration the treatment is continued for two or three years, followed by one year of observation with negative serological reactions. The reaction of the spinal fluid must be ascertained in each case. The so-called latent syphilitic is potentially infectious though untreated cases of 8 or 10 years' duration may bear children apparently healthy. Tertiary syphilis does not seem curable and in the

presence of nervous involvement one can not authorize procreation or marriage. In the absence of organic lesions, pregnancy is allowed after two or three years of treatment and one year of observation, the Wassermann reaction remaining negative.

Heredosyphilitics are dangerous. The second generation is susceptible to the infection of the first and has the appearance of being healthy. Pregnancy or marriage are allowed after two or three years of treatment and one year of negative serological reactions. In the absence of symptoms the author does not advise treatment for the wife of the old or latent syphilitic, unless the Wassermann is positive.

The laws of Colles, Baumès and Profeta need revision. It is not probable that the spermatozoon can carry the treponema. Organisms carried far into the genital tract by the spermatic fluid can and do account for obscure cases of syphilis that show the late accidents without ever having had demonstrable early lesions. A child born with syphilis, having a syphilitic father has also a syphilitic mother. This mother can nurse her baby with impunity since she already has the disease. If the mother contracted her infection in the last weeks of the gestation, the child, unless infected in the birth canal, may be free from the disease. This baby should be fed on a formula for twenty days (the Wassermann is not of value before that time).

Sterility caused by syphilis is exceptional. Pregnancy while it aggravates the local (pelvic) lesions, apparently has little influence on the general reaction. The influence of syphilis on pregnancy is well known. Abortion, miscarriage and premature labor are more common than full term stillbirths. There are three specific lesions that often complicate labor: (1) chancre of the cervix; (2) secondary sclerosis and atrophy of the fibro-muscular structures of the cervix; (3) infiltration extending into the lower uterine segment from cervical lesions. These lesions all interfere with cervical dilatation and predispose to tears. The resulting delay in labor may cause death of the fetus and possible amniotic infection. Internal medical treatment of cervical chancre discovered early prevents stenosis. If early in labor absolute cervical rigidity from the above causes is diagnosed, the membranes being intact, one may resort to cesarean section. Convelaire objects to abdominal section for delivery in the presence of florid syphilis. Incision of the cervix is often necessary to effect delivery. The child being dead, destructive operations need not be delayed.

Malposition, prolapse and inertia are common causes of dystocia with the syphilitic in labor. Hydrocephalus, ascites and monstrosities frequently alter the head diameters and complicate labor. Although syphilis predisposes to tears, infection and decidual endometritis with retention of placenta and membranes, involution after labor is fairly rapid.

Forty-one per cent of fetal deaths in gestation are due to syphilis. The effect of the disease on the infant is proportional to the age and virulence of the infection. The Wasserman or Hecht reactions are of little value in the newborn before the twentieth day. Placental hypertrophy is rare in syphilitics treated with arsenic. Manouélian has found the vessel walls of the villi and cord to contain many spirochetes. From the pathological study of the placenta, Favreaux concludes that the salts of arsenic are efficacious in the pregnant syphilitic.

There is no idiosyncrasy to arsenic among pregnant women and nursing mothers. Treatment during pregnancy should be vigorous and continued. The author advocates the use of neosalvarsan, starting with 15 centigrams and reaching 75 to 80 centigrams by the eighth injection. Frequently three such series, with mercury in the intervals, can be given before term. In cases with inaccessible veins the author advocates intramuscular injections of neosalvarsan or sulfarsenol.

Mercury is not sufficient in the treatment of infantile syphilis. If sinus or intravenous treatment are not practical intramuscular injection is made. If the treatment by mouth is to be employed, lactate of mercury (1-1000), 6 to 8 drops per day per kilogram weight are given in twenty day series. The treatment of choice in infants consists of mercury rubs ($\frac{3}{4}$ gm.) daily for 10 or 15 days, followed by the subcutaneous or intramuscular injection of sulfarsenol every 4 or 5 days for 8 doses. Ten days' rest periods are allowed between the courses, controlled by blood and spinal fluid reactions.

W. W. SHUTTER.

Cruikshank, J. N.: Syphilis as a Cause of Antenatal Death. British Medical Journal, 1922, No. 3222, p. 593.

From a study based upon the Wassermann reaction of over 3,500 specimens of blood and upon the clinical records of 1,000 pregnant women the author concludes: (1) That between 9 and 10 per cent of women of the "hospital class" in Glasgow show evidence of syphilitic infection. (2) That the results of the Wassermann reaction in the blood of the newborn are of little value in proving the presence of congenital syphilis. (3) That the incidence rate of congenital syphilis has been greatly exaggerated by most recent writers. (4) That syphilis in the mother cannot be shown to be a factor of predominating importance in the etiology of the interruptions of pregnancy in the earlier months. (5) That syphilis is one of the most important causes of stillbirth and of interruption of pregnancy in its later months, leading to premature birth, and, more particularly, to premature birth with death of the fetus.

F. L. ADAIR.

Moore, J. E.: Studies on the Influence of Pregnancy in Syphilis. The Course of Syphilitic Infection in Pregnant Women. Bulletin of the Johns Hopkins Hospital, 1923, xxxiv, 385.

In this article the author draws the following summary and conclusions:

(1) A critical study of the clinical and experimental evidence in the literature shows that in all probability neither Colles' law nor the theory of paternal transmission of syphilis directly to the fetus are valid. (2) The clinical data supplied by this study of 178 pregnant women with positive blood Wassermann reactions and 22 non-pregnant mothers of syphilitic children supports this belief. (3) Forty-four of these women, or 22 per cent, had outspoken lesions of early or late syphilis at the time of admission. Of the remainder, syphilis was proved or strongly suggested by the history, physical examination, response to treatment, or subsequent course, or a combination of these factors in 72 per cent. In only 21.5 per cent of the total 200 cases, therefore, were all evidences of syphilis (except a positive blood Wassermann) lacking. (4) This study also demonstrates that the factor of pregnancy may cause striking deviations from the usual course of syphilitic infection. If impregnation and infection approximately coincide, or if infection occurs during the course of pregnancy, the patient may develop the usual early manifestations of syphilis which are, however, much milder than if she is infected independently of pregnancy. Of those pregnant patients in whom the probable date of infection could be compared with the type of lesions present, approximately one-half behaved toward infection in this manner. (5) A slightly larger proportion of women, if infected with syphilis at about the time of impregnation, fail to develop any of the usual early lesions of syphilis. Under these circumstances, it is fair to assume that pregnancy is the factor which suppresses the lesions of the disease. (6) In a few patients (in this series, three of 200 women), the response to infection acquired at the beginning of or during pregnancy is markedly altered. The usual time relations between primary and sec-

ondary syphilis are much prolonged; on the other hand, the interval between early syphilis and tertiarism may be much shortened, and grave lesions of a tertiary type may appear early in the course of the disease. (7) The protection against early lesions of syphilis afforded by pregnancy may persist over a long period of years and possibly for a lifetime. Spontaneous cure of syphilis seems in a few instances to have been the ultimate result. In those women of this series who developed late syphilis, the viscera, and particularly the cardio-vascular apparatus were especially prone to involvement; whereas tertiary lesions of the skin or bones and neuro-syphilis, either clinical or asymptomatic, were rare. (8) It is shown that in 33 of these 200 patients, the blood Wassermann reaction gave anomalous results. In 10 per cent of the pregnant women with secondary syphilis, the reaction was negative. In the women with latent syphilis, it was prone to vacillate markedly without treatment; and in a number of cases, a negative or positive reaction during pregnancy spontaneously changed to the reverse after delivery. The possible factors responsible for this condition are briefly considered. (9) The nature of the mechanism by which pregnancy causes these alterations in the course of syphilitic infection is unknown. Various possibilities are mentioned.

C. O. MALAUD.

Findley, Leonard: The Antenatal Treatment of Congenital Syphilis with Salvarsan and Mercury. *British Medical Journal*, 1921, No. 3178, p. 887.

The treatment of congenital syphilis has been unsatisfactory. The author was unable to obtain a cure in 10 per cent of the children under one year and in 50 per cent of those who first came under observation when over one year old. In many of the cases considered cured there was subsequent return of clinical manifestations. The author estimates that 20 to 30 per cent of the pregnancies in syphilitic mothers result disastrously to the fetus. The results of antenatal treatment have been satisfactory. The author reports only 15 cases. In only one of these was the fetus lost. These children have subsequently remained well, some of them having been under observation as long as 7 years. The mothers subsequently gave birth to non-syphilitic children. The author thinks that pregnancy is a particularly opportune time for the treatment of syphilis.

F. L. ADAIR.

Boas, H., and Gammeltoft, S. A.: The Treatment of Syphilis During Pregnancy with Particular Attention to the Infants. *Acta Gynecologica Scandinavica*, 1922, I, 309.

Among 158 pregnant syphilitic women not treated at all, only one baby was born without syphilis. Among 87 patients who were treated with mercury before pregnancy but who received no treatment during pregnancy, all the fetuses but nine were luetic. Of 15 women treated with salvarsan before pregnancy and who had no treatment during pregnancy, all but three gave birth to luetic fetuses. Among 111 patients who received mercury during pregnancy, only 31 gave birth to normal children, while of 79 who received salvarsan during pregnancy, 60 had healthy babies. Nineteen of 26 patients who received salvarsan before pregnancy and mercury during pregnancy, gave birth to normal infants; whereas 6 of 7 women who received salvarsan both before and during pregnancy had normal children. From these results it is obvious that every pregnant woman who has syphilis should be treated with salvarsan during pregnancy even though she may have been treated intensively before pregnancy. Contrary to the statements found in many books on syphilis, the spontaneous gradual diminution in the transmission of lues to the fetus after repeated pregnancies, is not a common occurrence, unless the patients are treated during pregnancy.

J. P. GREENHILL.

Williams, J. Whitridge: *The Influence of the Treatment of Syphilitic Pregnant Women upon the Incidence of Congenital Syphilis.* Bulletin of the Johns Hopkins Hospital, 1922, xxxiii, 383.

Intensive work in the treatment and observation of a great many syphilitic pregnant women over a number of years, and in recent months a study of a number of their children from four to twenty-eight months after their birth, leads Williams to draw the following conclusions: Almost ideal results follow anything like efficient treatment of syphilitic pregnant women. Surprising results may sometimes follow what would ordinarily be regarded as altogether inefficient treatment in men or in non-pregnant women, which would seem to indicate that pregnant women are unusually amenable to antisyphilitic treatment. Some cases were extraordinarily refractory to treatment. There must be something about the pregnant condition which mitigates the virulence of the disease and predisposes to spontaneous cure.

C. O. MALAND.

Adams, John: *The Antenatal Treatment of Congenital Syphilis with Salvarsan and Mercury.* British Medical Journal, 1922, No. 3185, p. 56.

The author urges the earliest possible treatment of all cases of syphilis. This especially applies to newborn babies. He gives some tabulated results of the treatment of women during pregnancy and of newborn children. During a period of four years there were 113 mothers with syphilis treated; 31 babies were born alive with positive Wassermans; 79 with negative Wasserman; 4 of these babies died later. There were 8 stillbirths.

F. L. ADAIR.

Kirstein, F.: *Salvarsan Rash in Pregnancy. Death in the Puerperium.* Zentralblatt für Gynäkologie, 1922, xlv, 1634.

Kirstein refers to a case reported by Loreuzen (Zent. für Gyn., 1921, 39) of a salvarsan rash and resultant infection, and reports a similar case where the administration of salvarsan to a pregnant woman caused a skin rash which was remarkably irritating. In the previously reported case this skin irritation had been considered responsible for organisms introduced during vaginal examination, and the author, therefore, undertook vaginal examination with considerable trepidation. The patient became profoundly infected, and though the autopsy, some 14 days later, showed the presence of a severe infection of the lung, the suspicion remains that the death was possibly associated with the skin rash.

LITTLE.

Vignes, H., and Galliot: *The Prophylactic Treatment of Hereditary Syphilis in the Lying-In Hospitals of Paris.* Progrès Médical, 1923, xxxviii, 1.

Pleading for a more thorough diagnosis and more efficient treatment of syphilitic women and newborn babies, this article brings out clearly the various methods utilized in the maternities of Paris. To show that syphilis plays an important part in fetal mortality the authors quote the statistics of the Baudelocque Clinic for 1920—stating that 50 per cent of stillbirths and 25 per cent of children dying before the tenth day could definitely be ascribed to syphilis.

According to these authors the disease may be suspected by the history of previous miscarriages or stillbirths or by such complications as hydramnios or fetal death, also by fetal death before or during labor without sufficient other cause, or by manifestations of a luetic infection in the placenta. Finally the disease may be recognized by a careful examination of the newborn.

Syphilis once having been recognized, the mother, or if labor has taken place and the child survived, mother and child are immediately subjected to strenuous anti-syphilitic treatment. In the maternities of Paris this treatment has been assured by the inauguration of treatment stations in the hospitals themselves. The authors feel that in this way many cases are treated who, if merely advised to go to a general hospital for treatment, would be missed.

As a proof of the efficiency of early anti-syphilitic treatment the following statistics are quoted:

21 Women treated before and during pregnancy	
children living	21
children dead	0
29 women treated during pregnancy	
children living	27
children dead	2
16 women receiving only partial treatment during pregnancy	
children living	9
children dead	7
53 women not treated	
children living	20
children dead	33

THEODORE W. ADAMS.

Bernard, L: *The Relation of Pulmonary Tuberculosis and Pregnancy.* Paris Médical, 1922, xii, 22.

Of 164 tuberculous women seen in 1921, he found that the phthisis had its origin either during pregnancy or the puerperium in over 18 per cent. Of 327 female patients observed at a tuberculosis clinic in Paris, 81 (24 per cent) had recently been pregnant. This convinces him that there is no question that tuberculosis very frequently either has its origin or becomes aggravated during pregnancy or after confinement.

Of the 81 clinic patients, 55 had not had previous symptoms; of these, 22 developed their first symptoms during confinement, and 33 after delivery. Twenty six had had previous manifestations; of these 15 had an aggravation of symptoms during the puerperium, and 11 after confinement. Like Bar, Bernard found tuberculosis much more frequent in primiparae than in multiparae. In fact, he encountered only one case where the disease did not manifest itself until the fourth, and one until the sixth gestation.

He believes that lactation is a most deleterious factor. Of 27 women in whom the tuberculosis manifested itself after confinement, 18 had nursed their infants, while 3 had not nursed them. In 6 cases no accurate information was obtainable.

Nobecourt and Paraf had demonstrated a definite lowering of resistance to tuberculosis during pregnancy by the fact that in a tuberculous woman with positive cutaneous reaction, this reaction becomes negative during pregnancy. This would indicate that the immunity against the bacillus of Koch is definitely lowered during gestation. Bernard however, did not find this to be so in all his cases.

In spite of these figures, Bernard feels that therapeutic abortion is necessary only rarely, provided that the patient receives proper treatment. Especially in fibrous phthisis, the patient usually can be carried through pregnancy without very great risk if she is properly handled. Latent tuberculosis usually becomes aggravated only in the latter months of gestation when one naturally hesitates

doing an abortion in the hope of obtaining a viable child. The production of abortion will not always check the disease, the pregnancy usually being only an accessory factor and not the whole cause of the danger, as, e.g., in hyperemesis, in which the induction of abortion almost certainly cures the patient. The induction of abortion in itself is not without danger; it may, not frequently, be more disastrous than labor itself. Greater progress in this field will be made by earlier diagnosis and treatment. He has seen favorable results even in cascating tuberculosis by the administration of proper therapeutic measures, including pneumothorax. He has seen tuberculous women, under proper management, pass through successive pregnancies, the resulting children being perfectly healthy.

Bernard is very emphatic, however, about the deleterious effect of nursing, both to mother and child. Only under certain conditions, as when the child fails to thrive on artificial food, should it be permitted to nurse temporarily, and then only under the strictest aseptic precautions.

While Bernard has no fault to find with those who differ with him, especially the obstetricians, yet he feels that the latter, in contradistinction to the internists, have taken an altogether too pessimistic attitude towards this question.

R. E. WOBES.

Petruschky, J.: Further Observations on Pregnancy and the Offspring of Specifically Treated Tuberculous Women. *Monatsschrift für Geburtshilfe und Gynäkologie*, 1922, lix, 245.

In a previous communication (1911) the author has shown that 50 per cent of the women with open tuberculosis and 100 per cent of those with closed tuberculosis, who were treated properly, went through pregnancy without harm. In the former group 58 per cent and in the latter 100 per cent of the children remained alive. These figures prove that therapeutic abortion for tuberculosis is seldom indicated especially in cases of closed tuberculosis. The author also claims that the children of tuberculous parents instead of being predisposed to this disease, resist it better than other children.

Operations on tuberculous women should be reduced to a minimum because of the danger of metastases to the operative region.

Forty patients have been treated since 1911 with as much success as formerly. In all the patients the tuberculous process was improved. All the children were born free of tuberculosis and remained alive. Of late the author has combined pneumothorax with specific treatment. The latter is simple and should be tried before therapeutic abortion is contemplated; for when an abortion is performed, the child is always condemned and the mother is often made worse. Under specific treatment, not only are the children saved but the mothers are actually improved in health.

J. P. GREENHILL.

Dumarest, F., and Brette, P.: Pregnancy and Tuberculosis. *La Presse Médicale*, 1922, xxx, 531.

Prior to the middle of the nineteenth century, pregnancy was held to exert a beneficial influence upon tuberculosis. About 1850, cases of tuberculosis aggravated by pregnancy were reported by Mauriceau and by Grisolle, and little by little the idea of artificial termination of the supposedly malevolent pregnancy gained ground. Of late, this pessimistic attitude seems to be the prevailing one, even in France, where therapeutic abortion for tuberculosis has heretofore had practically no advocates. The authors have seen cases of this disease aggravated by pregnancy and by the puerperium, and have also been deeply impressed by several cases

in which pregnancy has apparently exercised beneficial effect upon the tubercular process. Details of nine such cases are given, the disease being of the chronic fibrous type except in one instance; in this patient a rapidly progressive ulcerative phthisis improved markedly during pregnancy, but it became more active after delivery, and the patient succumbed two years later.

The authors also report eight cases of pregnancy in women upon whom artificial pneumothorax had been performed, at intervals varying from nine years to a week or so before the inception of the pregnancy; in two cases pregnancy and pneumothorax were concomitant. One of these eight patients died the year following delivery; one could not be traced; one developed a lesion of the other lung two months after delivery (this was one of the concomitant cases); the others improved and the tubercular processes were arrested. In three instances treatment by pneumothorax was continued after delivery.

Induction of abortion or of premature labor is strongly condemned, except in the very rare case in which the mother's condition is extremely grave and the child is viable. Here labor may be induced in the interest of the child. The child's interests are held to be paramount in all cases for the following reasons: (1) if the mother has a slowly progressing fibrous phthisis, pregnancy will be beneficial; (2) if the mother's disease is very active, and is aggravated by the pregnancy, her chances of recovery are very poor anyway, and will hardly be improved by interruption of the gestation; in such a case artificial pneumothorax will often be marvellously beneficial. (3) Furthermore, supposedly hereditary tuberculosis is no longer feared. It appears probable that the human race (especially the white branch) is gradually acquiring an immunity to tuberculosis. In this development the children of parents with arrested tuberculosis play an important part, in that it seems possible that they inherit the immunity possessed by their parents at the time of procreation, and pass it on in turn to their descendants; thus will the bacillus of Koch ultimately be vanquished.

E. L. KING.

Winter and Oppermann: Tuberculosis and Pregnancy. Deutsche Medizinische Wochenschrift, 1923, xlix, 1, 45 and 76.

The question of tuberculosis in pregnancy has aroused renewed interest in Germany on account of the marked increase of tuberculosis during and following the war. In Winter's clinic the number of pregnant women with tuberculosis has gradually increased from 11 cases in 1917 to 33 cases in 1922. During the same time the number of deaths from tuberculosis in general has almost doubled, the relative increase being more marked in women of the child bearing age.

That pregnancy has a deleterious influence on the tuberculous woman is beyond dispute. According to 18 observers, the mortality after pregnancy varies from 16 to 100 per cent. Aggravation of an existing tuberculosis by pregnancy has been estimated variously by 14 observers at from 64 to 100 per cent. Of 138 pregnant women suffering from pulmonary phthisis who were observed by Winter, 93, i. e., 67 per cent showed unmistakable aggravation of their tuberculosis. In patients with latent or healed tuberculous processes, activation was observed in only one-fifth of the cases, while in active tuberculosis only 14 per cent of the patients remained uninfluenced by the pregnancy. In laryngeal tuberculosis, Winter believes, pregnancy means the death of the patient.

Various observers have estimated that of children born of tuberculous mothers only from 20 to 40 per cent reach the age of 20 years. Therefore, these authors feel that one is not justified in subjecting the mother to an undue risk in the hope of conserving the child.

Since pregnancy has no specific influence on the tuberculous process, the authors again warn against too optimistic a prognosis in case of therapeutic abortion, since the most one can hope for under these conditions is a cessation of such baneful influence which a continuation of pregnancy might have. The abortion in itself can have no therapeutic action. In latent or healed phthisis, abortion is contraindicated except in unusual cases. In active tuberculosis abortion is recommended at any stage of pregnancy up to the seventh month, premature delivery being indicated only in primary cases. In most instances, in which Winter refused to perform abortion in case of active tuberculosis, he had reason to regret it afterwards.

While in a given case it may be advisable to produce a second or even third abortion, the authors warn against repeated abortions as a suitable method of handling these cases. Sterilization may be obtained by operative procedures or, preferably, by x-rays. In cases where the woman is still young and a permanent cure may be looked for, temporary sterilization may be the method of choice. In numerous cases Winter has combined vaginal hysterectomy with interruption of pregnancy, thus not only sterilizing the woman, but saving her the periodical loss of blood incident to menstruation.

R. E. WORUS.

Books Received

LEHRBUCH DER STRAHLEN-TIEFEN-THERAPIE und ihrer Anwendung in der Gynäkologie. Von Prof. Dr. Ernst von Scuffert, Med. Rat der Hebammen Schule in München. Mit einem Geleitwort von Geh. Rat Prof. Dr. A. Döderlein. Mit 77 Abbildungen im Text und 21 Tafeln. Verlag von S. Karger, Karlstrasse, Berlin, 1923.

EINFUEHRUNG IN DIE KLINIK DER INNEREN SEKRETION. Von Professor Dr. G. Peritz, Nervenarzt in Berlin. Mit 31 Abbildungen. Verlag von S. Karger, Berlin, 1923.

DER GEBURTSHILFLICHE PHANTOMKURS. Von Professor Dr. Wilhelm Liepmann, Friedrich Wilhelm Universität in Berlin. Mit 165 Federzeichnungen. Verlag von Urban und Schwarzenberg, Berlin & Wien, 1922.

Item

The American Child Health Association announces that \$10,000 has been set aside for Resident and Travel Scholarships to be awarded to physicians who want to improve their qualifications for child health work. Application blanks and further information will be furnished on request to the Association, 370 Seventh Ave., New York City.

Erratum

In the abstract of Dr. George H. Ryder's article in the August issue of the *Journal*, on page 212, lines nine and ten should read: The total number of viable fetuses was 52; the number of viable fetuses lost 2, or 3.8 per cent.

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Original Communications

CYSTOCELE AND HIGH RECTOCELE*

BY THOMAS J. WATKINS, M.D., CHICAGO, ILL.

IT IS not necessary to discuss in detail cystocele and high rectocele before this Society. Only some of the newer and more important observations will be considered.

CYSTOCELE

Certain features of cystocele have become so generally accepted that they have ceased to be subjects for serious discussion, namely, (1) that cystocele is hernia of the bladder; (2) that the lesion is essentially a rent in the vesico-vaginal floor; (3) that the operative treatment should comprise a thorough dissection of the hernia, a firm closure of the ring and restoration of the bladder and urethra to their normal positions.

Various opinions obtain as to the best method of closure of the ring, and reposition of the urethra and bladder. The points which I desire to stress will be presented largely by means of illustrations.

Fig. 1 represents the vaginal mucosa separated from the bladder and most of the fasciae. The bladder has been separated from the cervix and the finger occupies the hernial canal. The extent and characteristics of the fascial rent can now be easily observed. *The tear is essentially transverse and not longitudinal.* Etiologically this could not be otherwise. The tension exerted upon the fasciae which produces a bladder hernia results from the fetal head forcing down the cervix during labor and ceases only when the cervix retracts. Longitudinal tension produces a transverse lesion. It is impossible

*Read at the Forty-eighth Annual Meeting of the American Gynecological Society, Hot Springs, Va., May 21-23, 1923.

NOTE: The Editor accepts no responsibility for the views and statements of authors as published in their "Original Communications."

to visualize any extensive lateral tension upon the fascia during labor. The urethral displacement that always obtains in cases of cystocele can only result from a transverse tear. The next illustration (Fig. 2) is from Frank's work and depicts the vesicovaginal fascia as viewed from above. The dotted lines we believe show essentially the nature of the lesion in cases of cystocele. The tension upon

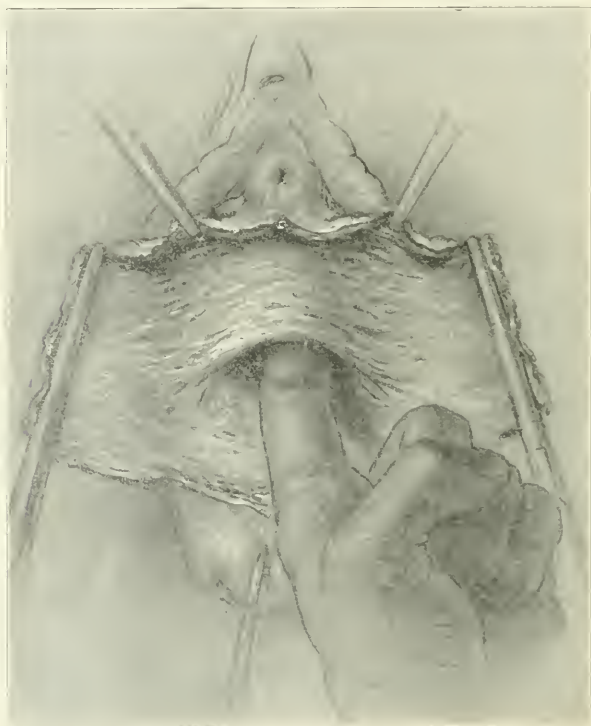


Fig. 1.—Vaginal mucosa separated from bladder and most of fascia. Finger occupies hernial ring.

the fascia during labor has separated it from the cervix and the base of the broad ligament. Fig. 3 is a diagrammatical illustration of the nature of the fascial lesion viewed from above.

Closure of the Hernial Ring.—This should accomplish (1) cure of the hernia and (2) cure of the urethrocele (urinary incontinence is often the prominent symptom of cystocele).

The transposition operation is ideal for the accomplishment of these two objects and the results obtained have shown it to be ideal in a

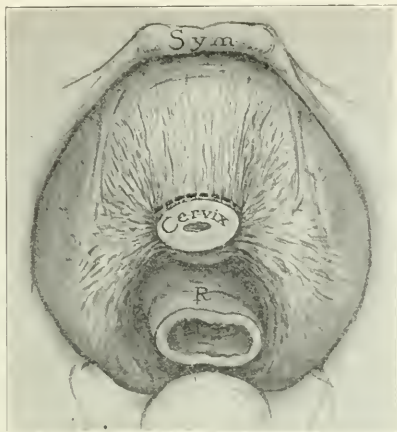


Fig. 2.—Vesico-vaginal fascia viewed from above. Dotted line common site of tear (from Frank).

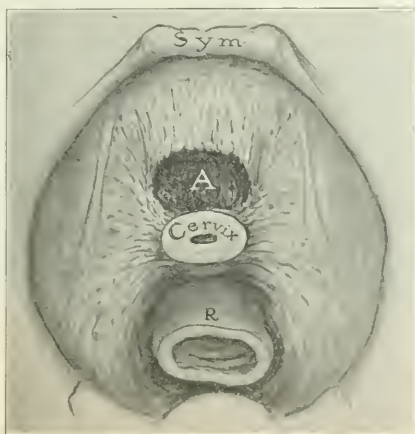


Fig. 3.—Hernial ring of cystocele shown from above.

limited class of cases. The limitations and modifications of the transposition operation have been discussed in former papers.

A firm closure can be obtained in a large majority of cases by the advancement operation with plastic repair of the broad ligaments. Goffe did pioneer work in establishing the advancement operation. The closure as illustrated (Fig. 4) should restore the torn edges of the fascia to the cervix. The bases of the broad ligaments on either

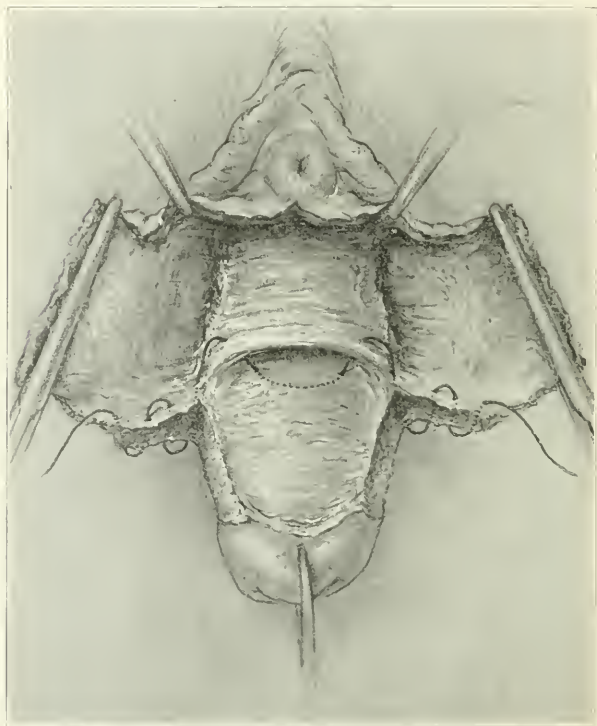


Fig. 4.—Suture of the free edges of the vaginal flaps to the cervix at about level of internal os, closing hernial opening.

side have been clamped and incised and fascial flaps have been reflected from the vaginal wall on either side. The hernial opening is closed by suture of the free edges of the vaginal flap to the cervix at about the level of the internal os. One or two sutures for this purpose are generally inserted before the broad ligament clamps are removed but are not tied, as tying them may interfere with accurate suture of the free edges of the broad ligament. The suture illus-

trated is inserted for the purpose of controlling the bleeding from the broad ligament and for the purpose of approximating the free edges of the broad ligament in front of the cervix. The sutures for closure of the hernia are first tied and then the sutures which include the cut ends of the broad ligaments are tied. One or two additional chromic catgut sutures are inserted if need be to obtain firm closure



Fig. 5.—Rectocele and cystocele.

of the hernia. It will be found that by this means the urethral canal has been restored to its normal position and the cure of urinary incontinence is assured. Care should be used that excessive traction is not made upon the urethra. This can be obviated by seeing that the urethra is left only in a relative state of fixation. (The amount of mobility of the urethra is generally proportionate to the extent of the urethrocele.)

Some plastic work is frequently required upon the cervix. This may consist in excision of the anterior lip or in amputation of the cervix, depending upon the requirements in the individual case. The operation is completed by the excision of any redundant mucosa and closure of the mucous membrane wound. In making the mucous membrane closure it is well to include some of the fascia or cervix in each suture for the purpose of obtaining increased firmness.

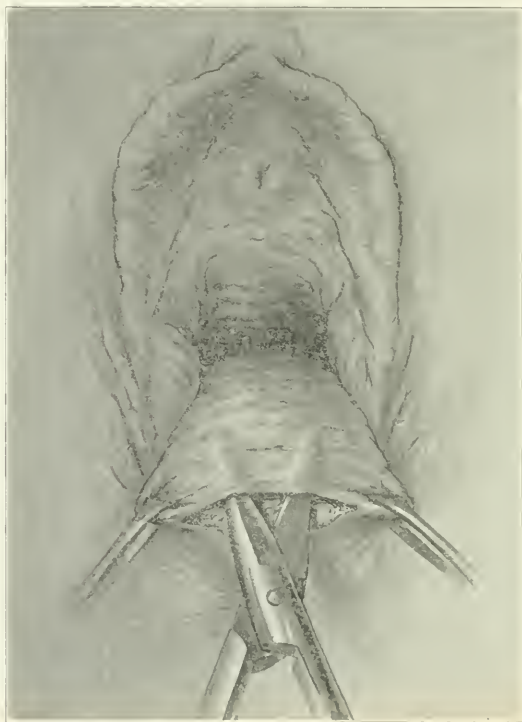


Fig. 6.—Blunt dissection of vaginal wall over rectocele.

In complete prolapse the two objects mentioned above can be accomplished by the Mayo operation or by a modified transposition operation. Personally we prefer to make in such cases a rather extensive plastic on the broad ligaments and to excise much of the uterus if large, leaving only enough of the lower posterior uterine wall to form a floor for the bladder. This permits leaving consider-

able of the broad ligaments intact and the result is not jeopardized in case of infection.

HIGH RECTOCELE

Experience with thorough dissection in cases of high rectocele has impressed me with the fact that the nature of the injury is like the



Fig. 7.—Hernial opening in rectocele.

one found in cystocele. By means of this dissection we have been able to outline the nature of the fascial rent and have found that the fascia is torn from the cervix and broad ligaments much as it is in cases of cystocele. During labor the tension upon this fascia is the result of displacement of the perineum below the pubes and the tension is consequently longitudinal and the result is a transverse tear. If the rectocele is thoroughly dissected it is easy to estimate by

approximation of the freed edges the site of the lesion. The edges of the hernial ring can be carried up to the cervix and fixed without undue tension. When this is done the result is that the perineal body is pulled forward toward the pubes in the line of its natural location. Fig. 5 is a high rectocele from which these illustrations were made.* Fig. 6 illustrates the technic of blunt dissection. This



Fig. 8. — + Indicates location of cervix. A, Broad ligament on either side. Torn edges of fascia retracted by forceps. Rectal hernia.

is made by making consecutive short median longitudinal incisions and by keeping the scissors as near to the mucous surface as possible, a procedure which minimizes the amount of injury to the rectovaginal fascia. In Fig. 7 the dissection has been carried up to the cervix. The vaginal flaps are held apart and the finger in the rectum

*The drawings were made from life and accurately illustrate the lesion.

demonstrates the nature of the hernial opening. In Fig. 8 all the fascia has been carefully dissected from the mucous flaps. The freed edges are put on tension so as to illustrate the amount of rent in the fascia. The free edges of the fascia can be carried up to the cervix without undue tension, which means that this fascia has been torn from the base of the broad ligaments and from the posterior wall to



Fig. 9.—Torn edges of fascia flaps are sutured to the broad ligament and posterior to the cervix.

the cervix. Fig. 9 shows the suture which restores the free edges of the hernial ring to the base of the broad ligaments. In bad cases we frequently use a linen suture and in moderate cases chromic catgut sutures. Additional sutures are inserted as needed for firm closure of the hernia. These sutures should be so inserted that when tied they are not on undue tension. Fig. 10 shows the hernia closed. The

operation is completed by excision of any redundant mucosa and by subcutaneous suture with plain catgut. When the operation is completed rectal examination will show a fairly firm wall, much like the normal, extending from the anus to the cervix.

High rectocele has received considerable attention of late and some excellent papers have been presented by Ward, Spaulding and Frank.

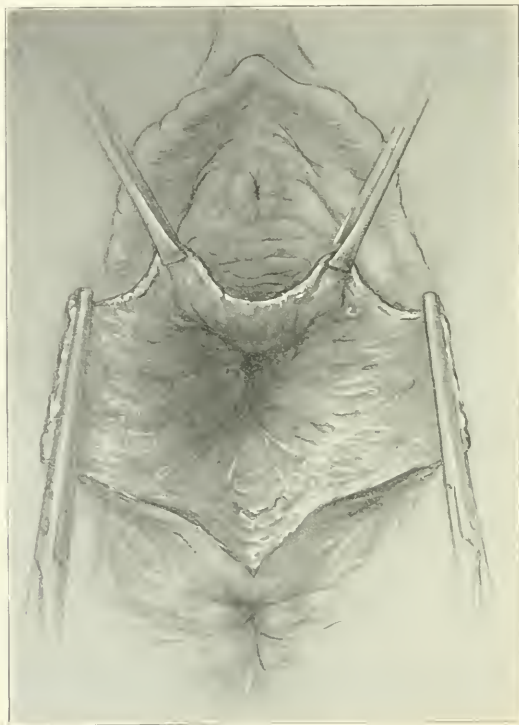


Fig. 10.—Hernial opening closed.

The obliteration of the deep peritoneal pouch according to the method of Ward will probably prove to be of great value in selective cases. My experience with this operation dates from 1919.¹ The results have been very encouraging and have been improved much of late since a more thorough dissection has been made.

¹Surgical Clinics of Chicago, October 1919, page 1231.

SUMMARY

Cystocele is hernia resulting from a transverse tear in the vesicovaginal fascia. The tear is almost universally from near the site of the cervix.

Closure of the ring and restoration of the fascia to its normal location will cure the urethrocele.

Plastic repair of the broad ligaments insures firm closure of the ring.

The operation is simple if treated as a distinct hernia and failures should generally mean faulty technic or judgment.

High rectocele is a transverse tear in the rectovaginal fascia. The site of the lesion is near the cervix. With thorough dissection the torn edges of the fascia can be easily exposed and sutured into normal position.

In perineal lacerations the fascia and muscles are also often injured near the rami of the pubes but this class of lesion is not presented for discussion at this time.

104 SOUTH MICHIGAN AVENUE.

(For discussion, see p. 487.)

RELATION BETWEEN PLACENTA AND THE SECRETION OF MILK*

BY PROFESSOR DR. OSKAR FRANKL, UNIVERSITY OF VIENNA, AUSTRIA

IN SPITE of many investigations and studies the question of the relation of the placenta to lactation has remained an unsolved problem. We know that the placenta during pregnancy, presumably in conjunction with ovarian function, is responsible for the hyperemia and development of the mammary gland and the formation of colostrum. True milk, however, appears only after the expulsion of the fetus. It remained an open question whether in this connection the placenta though acting as a stimulating factor on the breast gland simultaneously inhibits the secretion of milk. Obviously this question is closely connected with the mooted problem whether the placenta can be regarded an organ endowed with an endocrine function.

Adler, Thaler and Frommer demonstrated that under the combined effect of pregnancy and the injection of placental extracts animals are liable to manifest a subtetanic state. It is a well-known fact that an intervening pregnancy checks the function of lactating breast glands. Such facts make it very probable that the placenta is producing some substance with a definite biochemic effect on the organism. But such experiments are not entirely convincing and it became necessary to resort to different types of investigation.

*Read at the Forty-eighth Annual Meeting of the American Gynecological Society, Hot Springs, Va., May 21-23, 1923.

That the fetus is not the deciding factor in the secretion of milk is proved by active lactation subsequent to the expulsion of a hydatiform mole or a dead fetus. Ovarian function in relation to lactation is distinguished by the fact, on the one hand, that castration performed during pregnancy does not preclude lactation, while, on the other hand, in the experience of animal breeders castration is successfully resorted to for the purpose of prolonging for a longer time lactation in the mother animal.

The influence of the nervous system on lactation cannot be regarded as deciding because, in the human, normally functioning breasts have been observed in cases of complete transverse lesions of the cord and, in animals, normal milk secretion in mammae successfully transplanted into other regions. In this respect convincing, prove also experiments on artificially united (parabiotic) animals and the observation made on the pyopagie sisters Blazek, carefully studied in our clinic in Vienna. In experiments on animals and this one observation on the human typical milk secretion was seen after delivery of the pregnant twin, also in the other nonpregnant conjoined individual.

Many attempts are recorded in literature of producing secretion of true milk by the injection of placental extracts and of emulsions of placental tissue, with varying results. It is noteworthy that similar results were obtained by other investigators with the injection of extracts prepared from tissues other than placenta. Cristea and Asehner were successful in reestablishing a previously existing milk secretion by means of various lymphagogues. The objections made frequently that all such experiments with the injections of protein bodies cannot well be compared with the physiologic function of an organically connected organ like the placenta, certainly are fully justified.

Halban as the first claimed that it is directly the loss of the placenta which changes the secretion of colostrum into one of milk. To prove or disprove this theory I designed certain experiments, consisting in the transplantation of the placenta of a mouse under the skin on the back of another mouse. Such grafts in general led to three possible end-results. In case of an intervening infection a large abscess formed destroying the implanted placenta. In other cases, aseptically accomplished, the graft did not take and the placenta became rapidly necrotic. In the third, successful group, the implanted placenta established satisfactory connection with the adjoining tissues and the organ could be observed to persist for about three to four weeks. After this time histological studies show a complete absorption of the grafted placenta.

In these experiments the placentas of pregnant mice were employed within ten or twelve days of full term and transplanted under the

skin of the back of mice approximately in the same stage of pregnancy. In this third group of successful transplants the following results were observed: Mice, from a strain known to be able to nurse satisfactorily their young, would have litters of five or six. The newborns would seem normal in their appearance and would immediately begin to suck the mother animal. But they invariably died within the next five to seven days, evidently from starvation. Investigations showed that the mamma of the mother animal was secreting colostrum and not milk. In the unsuccessful transplants of the first and second groups lactation proceeded normally. *A successful transplantation of a placenta on a pregnant animal causes persistence of colostrum secretion.*

These same animals were permitted to become pregnant again and again they were able to nurse their young.

These experiments, therefore prove clearly that in animals, known to have ample milk, the effective grafting of placenta temporarily hinders milk secretion, evidently under the influence of an active hormone supplied by the living placenta.

This ability of the placenta to prepare during pregnancy the mamma for its secretory function but at the same time to inhibit actual function has its perfect analogy in the function of the corpus luteum. Also the yellow body through its hormones prepares the endometrium for menstruation by causing the typical premenstrual swelling, but only the involution of the corpus luteum, which follows the death of the ovum, determines the appearance of the menstrual flow.

Of special interest proved to me a recent article in the AMERICAN JOURNAL OF OBSTETRICS AND GYNECOLOGY by Stimson. He showed that the retained portions of the placenta could hinder milk secretion, which developed normally immediately after the removal of the retained tissue. This observation corresponds exactly to the results of my own experiments on animals. Also this clinical experience points clearly to the fact that the placenta must be regarded an organ endowed with endocrine activity, whose function it is during pregnancy to prepare the breast glands for the secretion of milk and simultaneously to prevent secretory activity.

ERSTE FRAUENKLINIK, VIENNA, AUSTRIA.

(For discussion, see p. 489.)

FOLLOW-UP RESULTS OF 908 CASES OF UTERINE CANCER TREATED BY RADIUM*

BY HAROLD BAILEY, M.D., AND WILLIAM P. HEALY, M.D.,
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WE have used radium in the treatment of uterine cancer at the Memorial Hospital for over eight years and from time to time we have reported our results. In May, 1921, at the last presentation, it was apparent that there was considerable improvement in the results of the second three-year period and we ascribed this improvement in the years 1918 to 1920 to the difference in our methods of treatment. To some extent this still holds good. In the first three years, 1915, 1916, and 1917, the treatment was conducted with a limited amount of radium and its application was localized as in the Continental procedure. At the end of the year 1915, our attempts to cross-fire through the rectum and through the uterus were discontinued because of the frequency of rectovaginal fistulae.

The technic adopted in 1916, which we still think well of from the standpoint of those operators using amounts comparable to 100 mg., consisted in the reapplication of the radium to different areas in the cervix. The first week 1200 millieurie hours were used, the following week the same dose and the third and fourth weeks a slightly smaller dose. This always leads to a deep slough in the cervix, but it concentrates the radium in the center of the disease.

In some thirty cases use was made of the Percy operation with the radium application two weeks after the burning, but it was finally given up because the majority of the cases developed fistulae. Of the thirty Percy cases, one patient treated in 1915 is well today. Another patient, burned by Dr. Le Roy Brown and sent to us in 1915 for radium treatment, is well; and a third who had two cauterizations and was later treated by us in 1916, was well at the time of writing this report. However, we believe that the interference with the blood supply in addition to the cauterization and the tendency of the operator to burn too extensively, together with the thinness of the barrier for filtering the radium that is afterwards applied, renders the operation inapplicable in most cases.

From the year 1918 to date we have made great use of cross-firing from the vagina, from the neck of the uterus and from the external surface of the body and practically all our cases have been so treated during this last period of five years.¹ The particular method devel-

*Read at the Forty-eighth Annual Meeting of the American Gynecological Society, Hot Springs, Va., May 21-23, 1923.

oped was the use of a platinum piece in the cervix with another above in the neck of the uterus for a total of about 3000 millieurie hours and the radiation of the parametrium by a mass of radium equal to a gram or more placed in the vault of the vagina in the so-called bomb container which is directed toward each lateral fornix in turn, and a central application against the cervix to reinforce the amount of radiation in the tissues immediately adjoining the cervix. The external application was given by radium on a block applicator placed in six different regions around the pelvic girdle, a half skin dose being given in each place. We found that when a full erythma dose was given with additional irradiation from below, the skin area would be severely burned. Lately, that is in the past year, we have substituted for the block which gives only a small dose deep in the pelvis, x-ray with prolonged and intensive application. We believe that some form of external irradiation is necessary and advisable in most cases.

Our technic with x-ray has been to give the irradiation through four areas, two on the front and two on the back of the body and so arranged that the entire skin surface over the pelvis is covered. Two tubes working simultaneously and so placed that the rays converge toward the center of the pelvis result in considerable cross-firing beneath the skin surface. The first application is for 15 minutes, the second occurs 48 hours later for the same length of time. The filter is 5 millimeters of aluminum, the focal distance 12 inches, the spark-gap 10 inches and the kilovolts 90 to 110 with 5 milliamperes of current. The additional irradiation thus provided is of considerable value in the treatment of the areas involved by cancer that are some distance from the cervix and vaginal vault.

The follow-up has been particularly difficult because in the earlier years we were working in a new field and the length of time of the action of the radium, the depth to which efficient irradiation is carried and the later results from the production of fibroid tissue were all unknown to us, and these patients had to be brought in very frequently for observation. As the years passed these women were asked to return to conferences for the instruction and information of visitors from this country and from abroad. After four or five years of this frequent following and control, the women objected decidedly and in a few instances it is now impossible to get them to come back. Some even seek to avoid observation and recall by refusing to answer letters and moving to new addresses without informing the hospital. A very personal request is necessary for those who have been more than five years in the follow-up service; a nursing call or letter is rarely effective. However, without the Social Service Workers, we would be in a very poor position to continue our work; their energy and tact have helped to make this report possible. Most of the

cases of the first four years have been seen by us, but from a number we have accepted, as evidence of their present condition, either a personal letter or a letter from their physician, stating that their health was satisfactory. Those cases that have been lost, and there are quite a number of them, have been accepted as a charge against us, in other words they have been considered as dead. Occasionally after one of these reports a case which has been placed in the final list returns, but this is unusual and does not interfere to any extent with the statistics.

Advanced Primary Cervical Cancer.—In this group there was very little hope of producing a cure under any circumstances. Not only was the cervix involved but the parametrium as well when the treatment was undertaken. In the first two or three years all the advanced cases were treated whereas now we limit ourselves to those cases in which there is apparently an opportunity to irradiate beyond the outlying part of the tumor growth. We are averse to treating the very advanced cancer with radium even with the so-called palliative treatment. It seals up the surface of the growth and there is no outlet for the broken-down areas beyond. To give a heavy treatment such as we use in the other cases to one of these women produces a condition of pain and distress that is beyond description.

The advanced primary cancer forms the largest group of our patients. If we take the first three years, 1915, 1916, and 1917 in which the radiation was without any decided amount of cross-firing there were in all 80 cases and but two women are alive. In 1918 with the use of the bomb and block there were 41 cases, and six women, or 14.5 per cent, are alive and free from the disease today. In 1919 there were 69 cases with but 5 or 7 per cent well and two alive with the disease progressing. In 1920 there were 92 cases with 8 or 8.7 per cent alive and no evidence of cancer, and seven alive with symptoms.

In 1921, there were 85 cases, and 12, or 14 per cent, have no evidence, and 19 are in various stages of the disease. In 1922 there were 80 cases, and 12, or 15 per cent, are apparently well, and 45 others are alive. While not enough time has elapsed since the treatment of the cases of the last two years to give any idea of the final results, still of the 165 cases that were beyond the aid of surgery, 24 cases now show no clinical signs of cancer.

Borderline Cervical Cancer really laps over into the advanced group and the line of demarcation is a clinical one and largely influenced by the personal equation of the examiner. In general, in our opinion, these cases were not suitable for surgery. In the first five years there were 33 cases of which 8, or 24 per cent, are alive. All but one of these are known to be free of evidence of the disease. In the last three years there were 51 cases and of these there are 22, or

43 per cent, with no evidence and 15 show the presence of tumor tissue.

In the *early operable group* there were 11 cases treated previous to January 1st, 1919. Of these, 3, or 27 per cent, are alive and free from evidence of cancer for five years or more. If the rate is corrected by deducting 3 deaths from intercurrent disease and one following operation in another clinic the result is 43 per cent clinically cured for the period. In the last four years there were 48 cases and of these 32, or 66 per cent, are free from evidence of the disease. If we are permitted to deduct 3 cases, one dying after an operation in another hospital a week after treatment and two others giving false addresses so that they could not be followed, there are 32 alive of 45 cases or 71 per cent. In these early operable cases we naturally look for and hope to get excellent results from irradiation and very few of our cases receive any other treatment.

However, there seems to be no doubt that hysterectomy alone has cured cases of cancer of the cervix and for that reason it may, at times, be considered advisable, in very favorable cases, to follow the full irradiation treatment by an abdominal hysterectomy some weeks later so that the patient will not be deprived of any advantage which may accrue from such procedure. Just how much is to be gained by this is still a matter of conjecture.

Recurrent Cancer.—Previous to 1918, there were 52 cases and 2 are alive and well and one other is alive but with some evidence of tumor. In the past five years during which time the technic has been considerably elaborated by the use of cross-firing and the embedding of radium emanation in the lesion, a remarkable number of these cases has been apparently cured. There were 168 cases in this group and 38, or 22 per cent, have no clinical evidence of cancer.

Prophylaxis Following Hysterectomy.—This is a very interesting group made up entirely of cases referred by various operators soon after abdominal panhysterectomy had been done in each case. In no instance was there any evidence of cancer when the patient presented herself to us for treatment; therefore it seemed probable that the best procedure would be to irradiate the entire pelvis by means of cross-firing with the bomb placed within the vagina and the radium block or more recently the x-ray for deep external radiation. There were 29 cases from 1917 to 1923 and of these 21, or 72.5 per cent, are alive and well and have remained free from any sign of recurrence and five of these cases have been well for five years.

Cancer of the Body of the Uterus.—We have had 41 cases of this type of which 21, or 49 per cent, are alive and well. Three of these have passed the five-year period. Nine of the 21 cases had hysterectomy following the irradiation. In the other cases hysterectomy was

not considered advisable because of other complications or constitutional diseases and these cases have been treated by irradiation alone. The plan followed was the introduction of radium into the uterine cavity for 3000 to 4000 millicurie hours with light filtration and external radiation with x-rays. Despite this treatment in nearly every instance subjected only to irradiation evidence of the disease reappeared within a year.

FOLLOW UP OF 908 CASES OF UTERINE CANCER TREATED BY RADIUM TO
JANUARY 1ST, 1923*

	ADVANCED PRIMARY CERVIX	BORDERLINE CERVIX	EARLY OPERABLE CERVIX	RECURRENT	BODY OF UTERUS	PROPHYLAXIS AFTER HYSTERECTOMY	PERCY
1915	15	0	1 (1)	18 (1)	1 (1)	0	15 (2)
1916	24 (1)	3 (0)	3 (0)	9 (1)	1 (0)	0	11 (1)
1917	41 (1)	3 (1)	3 (1)	26 (1)	0	2 (0)	
1918	41 (6)	17 (5)	4 (1)	35 (4)	7 (2)	8 (6)	
1919	69 (11)	10 (2)	9 (6)	43 (5)	5 (1)	4 (3)	
1920	92 (14)	12 (3)	13 (4)	37 (14)	5 (3)	10 (8)	
1921	85 (31)	12 (9)	10 (8)	24 (14)	9 (8)	3 (3)	
1922	80 (57)	27 (26)	16 (16)	29 (25)	13 (12)	2 (2)	

*Figures in the parentheses represent the number of cases alive January 1, 1923.

These results, we believe are sufficiently encouraging to be worthy of careful consideration. It is our opinion that they could not have been obtained without the use of massive doses of radium and without thoroughly radiating the parametrium.

REFERENCE

- (1) *Bailey and Quimby*, AM. JOUR. OBST. AND GYNEC., February, 1922, iii, No. 2.
MEMORIAL HOSPITAL. (For discussion, see p. 491.)

CONTRIBUTIONS TO THE PATHOLOGY OF VULVAR DISEASES

A, ANGIOMATOUS TUMORS OF THE VULVA; B, ABSCESS OF THE CLITORIS;
C, GRANULOMA INGUINALE; D, LEUCOPLAKIC VULVITIS

BY FRED J. TAUSSIG, M.D., ST. LOUIS, MO.

DURING the past few years it has been my good fortune to see a number of interesting conditions about the vulva concerning which but little has been written. A brief clinical history of these cases together with the attendant pathology has seemed worth while placing on record. I have also during this time had occasion to see and study the histopathology of an additional series of cases of leucoplakic vulvitis, some of which were associated with vulval cancer and have summarized my present views upon this disease.

A. *Angiomatous Tumors of the Vulva.*—It would seem that most of these tumors develop on the basis of a congenital nevus. Hemangiomas are most frequently found in little children (as seen in the reports of Kennig, Guyot and Saenger). Occasionally they are associated with telangiectatic swellings. Lymphangioma of the vulva also has been described by Brindeau, Epstein and Duret but the term lymphangioma should be limited to the definitely circumscribed tumors. An illustration of these types can be seen in the following:

1. *Hemangioma* in a baby four months old. At birth a flat nevus was observed in the region of the left labium majus. It grew steadily and at the time of operation was 15 × 15 mm. in size and 2 mm. above the level of the skin. The skin showed a slight tendency to ulceration. The growth was excised and microscopic examination showed a typical hemangioma.

2. *Telangiectatic Angioma of the Clitoris and Labium.*—This patient was twenty-eight years old, unmarried, and according to the statement of her aunt, was born with a birthmark at the site of the vulval tumor. Since puberty it had grown larger and repeated slight bleeding had occurred. Not until three weeks previous to her admission to Barnes Hospital had there been any pain. The entire right labia at this time were converted into a mass the size of a hen's egg consisting of a network of varicose veins. The clitoris formed a blue swelling the size of an acorn. The left side was unaffected. The tumor removed at operation showed on microscopic section numerous telangiectatic veins (Figs. 1 and 2).

*Read at the Forty-eighth Annual Meeting of the American Gynecological Society, Hot Springs, Va., May 21-23, 1923.

3. *Lymphangiectatic Hypertrophy of the Vulva on a Basis of Nevus Unius Lateralis*.—This unique condition seen in a girl sixteen years old at the Barnard Free Skin and Cancer Hospital was also congenital. A small reddish area was noted by her mother at birth. Eighteen months later it became more prominent. The tumor grew more rapidly after the age of thirteen when menstruation began and continued at intervals of from 6 to 8 weeks. Salves and washes had been employed by the girl to relieve the irritation produced by the profuse milky-white vulval discharge.

On examination the right labium majus and minus together with

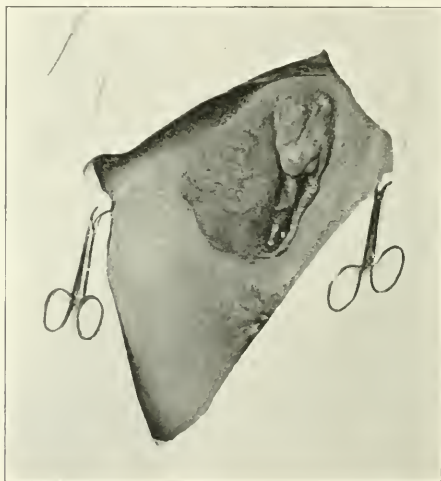


Fig. 1.—Telangiectatic angioma of the right labia and clitoris.

half of the clitoris was converted into a thickened irregular swelling with a few warty projections about the prepuce (Fig. 3). The peri-anal skin on the right side was also thickened and showed papillary excrecences. Most striking was the exactness with which the lesion was limited to the right side. The lesion in the erural folds was, as confirmed by biopsy, only a secondary dermatitis resulting from the irritating lymphorrheal discharge. Of further interest was the fact that a unilateral nevus was also present upon the lips and tongue of this girl. The hypertrophic labial mass was removed surgically and microscopic section showed a combination of condylomatous epithelial proliferations with marked lymphangiectatic swell-

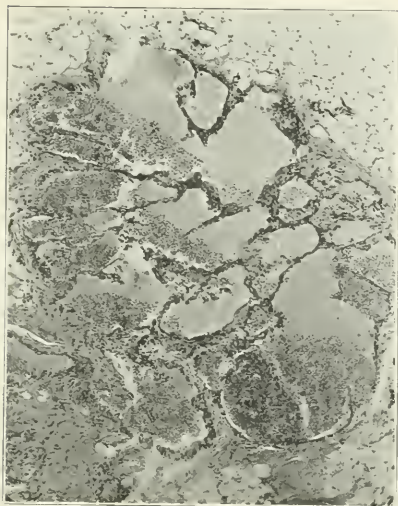


Fig. 2.—Telangiectatic angioma (microphotograph).



Fig. 3.—Lymphangiectatic hypertrophy of the labia on a basis of nevus unius lateralis.



Fig. 4A.—Lymphangiectatic hypertrophy of the vulva. Area outlined in broken lines is photographed with higher magnification in Fig. 4B.

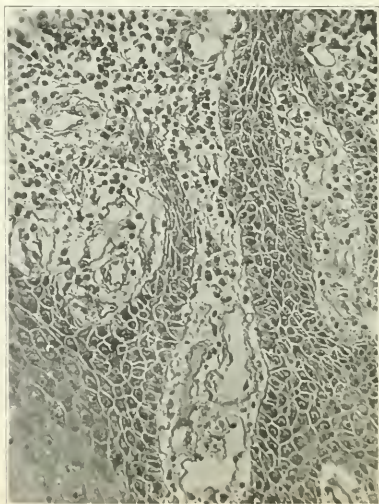


Fig. 4B.—High power photograph of the area outlined in Fig. 4A.

ing in the subjacent dermis (Figs. 4A and B). A more detailed description of this case will be published later.

B. *Abscess of the Clitoris*.—While abscesses of considerable size not infrequently develop from furunculosis and Bartholinitis, I have found no record of any extended suppurative process involving primarily any portion of the clitoris. The following case is of interest not merely because an abscess was situated in this unusual site, but also because it seemed definitely responsible as the chief focus of infection for a chronic arthritis from which the patient has been suffering many years.

Mrs. A. B., forty-six years old, 2-para, had had a small abscess in the upper left vulval region lanced eight years previously. There was no history of gonorrhea and the scar from this incision was found on a line with the clitoris and 2 cm. to its left. The patient stated that while she experienced no further pain in this region after the incision, there was at times occasional discomfort with a slight offensive discharge the source of which she could not determine. During these eight years symptoms of chronic arthritis developed with occasional slight elevations of temperature. A search for the primary focus had been directed everywhere except the genital region. Finally on August 4, 1922, after a lapse of eight years, a fever of 103° with vague abdominal pains suggested a possible appendicitis. The fever remained high for 5 days, then the abdominal pains subsided and suddenly acute pain in the vulval region was experienced. I was called in consultation and found a small hard mass the size of an acorn in the region of the left crus of the clitoris directly beneath the scar of the former incision. Hot poultices within 36 hours led to the formation of an abscess the size of a walnut at this point.

A few drops of pus escaped from a pinpoint opening near the old scar. The main abscess sac, however, was still deeply situated, and, in view of the history of prolonged infection, it was deemed best to remove the entire mass, instead of merely incising the abscess. The accompanying photograph (Fig. 5) shows clearly the site of this abscess. The cross-section (Fig. 6) indicates the thickness of the abscess sac, but since about one ounce of pus escaped from it before the tissues were hardened, the cavity is much smaller than at the time of removal. Microscopic sections of the lining (Fig. 7) showed a pyogenic membrane without any visible epithelial elements and a diffuse suppurative process infiltrating the connective tissue wall.

C. *Granuloma Inguinale*.—A more careful analysis of certain types of chronic ulcerations about the genitals in the negro race, that have in the past been termed chronic chaneroids, lupus or rodent ulcer, show that a certain group of these cases are characterized by extensive superficial ulcers extending up into the inguinal region, a fairly typical reaction to intravenous administration of tartar emetic, and

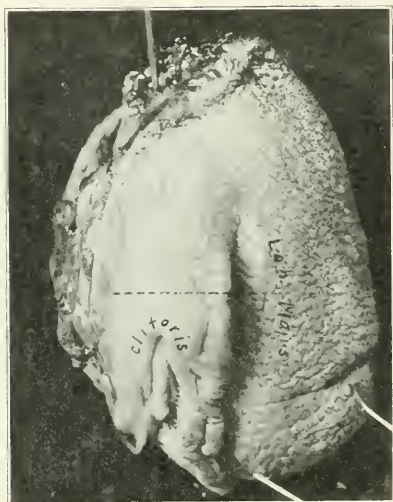


Fig. 5.—Abscess of the clitoris, specimen removed at operation.



Fig. 6.—Cross section of abscess at a point shown in dotted line on Fig. 5. The abscess cavity is collapsed. It contained about 30 to 50 c.c. of a thick pus.

the presence of bacteria termed Donovan's bodies in the secretions and tissues of the ulcer. While further investigations are still required for positive proof of the etiology of this disease, I think we can accept "granuloma inguinale" as a definite clinical entity. The recent reports of Randall, Small and Belk are particularly convincing.

I am able to contribute a brief report of two cases to the literature on this subject.

1. The first case was observed by Dr. E. F. Schmitz to whom I am indebted for the permission to include it in this report. This patient, a negress, was so dull mentally that no history could be obtained from her further than the fact that the sores have been present for several years and that antiluetic treatment, cauterization and local

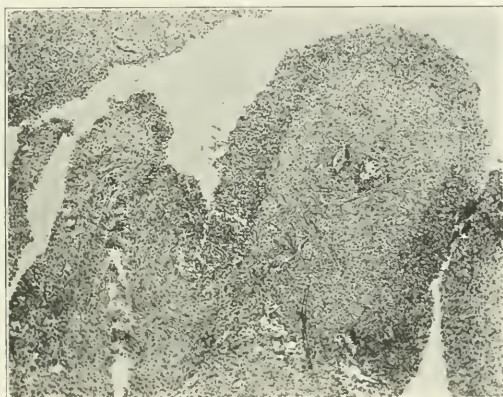


Fig. 7.—Abscess of the clitoris. Pyogenic membrane lining the cavity.

applications had failed to prevent their gradual extension. She was a negress of about thirty years of age. She had no other physical ailments. The ulcers were typical of "granuloma inguinale." Injections of tartar emetic were given with marked improvement. The edges showed definite healing. Unfortunately, ten days after her admission to the City Hospital, following the fourth injection of tartar emetic the patient suddenly died. An autopsy could not be obtained.

2. In the second case the record is more complete. This patient, a negress twenty-eight years old, had had two children, both delivered by cesarean section, one of which was done by me in 1916. At this time the vulva was normal. Menses were regular up to three years ago when an ulcerative process began about the vulva. Wassermann reaction was repeatedly negative. Ducrey bacilli were ab-

sent. The ulceration gradually extended from the vulva and perineum to the left inguinal fold, its edges irregularly outlined, not undermined, the ulcer very shallow and its base for the most part smooth and clean. For the past few months a similar superficial ulcer had appeared upon the lower lip of the mouth. A biopsy specimen was obtained from the lip and vulvar ulcers and showed identical lesions, merely a chronic granuloma without giant cells, tubercles or evidence of epithelial proliferations. In smears from the secretion and in some of the sections typical Donovan bodies were found. Injections of tartar emetic given intravenously caused improvement but, as yet, two months after treatment was begun, the ulcers have not entirely healed. A full report of the case will be given elsewhere.

D. Leucoplakic Vulvitis.—In a previous article* I analyzed 21 cases of leucoplakic vulvitis seen up to 1919. In the past four years an additional 19 cases have come under my observation, making a total of 40 in all. A number of these patients were referred to me by my colleagues, Drs. Ehrenfest, Gellhorn, Engman, Mook and O. Schwarz, otherwise it would have been impossible for me to have collected such a considerable material for study in these ten years. I think I am right in saying that this is the largest material that has as yet been utilized for a clinical and pathologic investigation of this disease. While I have not fully completed the histologic portion of this work, I can at the present time give a brief summary of my conclusions. Material for the histologic study was obtained in 29 out of the 40 cases, in 25 by complete vulvectomy, in the remaining four by biopsy or antopsy excisions. In 18 cases (45 per cent) the leucoplakic vulvitis was complicated by a carcinoma. If in my first series the incidence of carcinoma was 66 per cent, while in the series since 1919, the incidence of carcinoma was only 21 per cent, this may in part be explained by the fact that the profession and to some extent also the laity have learned to recognize leucoplakic vulvitis as a so-called precancerous condition and more radical measures have been used to cure this disease before a cancer developed. In fact, I am convinced that if the laity and profession were cognizant of this tendency of leucoplakic vulvitis to stimulate a cancer and excised the affected area, the incidence of vulval cancer could be cut down almost one half. During the past 11 years I have seen 36 cases of cancer of the vulva, 18 of which showed evidence of having developed on a basis of leucoplakic vulvitis.

Nicknames cling to diseases as they do to human beings. I suppose it will be many years before the term kraurosis vulvae will be dropped from our textbooks. Unfortunately Breisky in his first twelve cases saw such a high proportion in which the vaginal outlet

*Arch. Dermat. and Syph., June, 1920, n. s., 1, 621-635.

was constricted, that he considered this constriction as the main feature of the disease and hence employed the term kraurosis (to shrivel up) to distinguish it. He did not appreciate that the same clinical pathologic picture could be present without such constriction and that the constriction could occur at times without any evidence of the characteristic histologic changes he had found.

Kraurosis, therefore, is a symptom and not a disease. If we use the term at all, it should be limited to that simple form of atrophic vulvitis resembling in its pathology and course atrophic vaginitis which is unattended by leucoplakic changes. I would prefer to call this condition atrophy sclerosis of the vulva, and so eliminate the ambiguity that still clings to the term kraurosis.

In this series of 40 cases of leucoplakic vulvitis, the symptom of kraurosis was present 16 times and always only in these women in whom the entire vulva was involved in the leucoplakic change. It is evident that the formation of a kraurosis must depend partly on the condition of the vaginal outlet previous to the onset of the disease. In a multipara with relaxed outlet the most extensive leucoplakic vulvitis will not produce kraurosis. In nulliparae or virgins, on the other hand, such a constriction is readily formed.

We may distinguish two types of leucoplakic vulvitis, one in which the affected area is one-sided and somewhat irregular in shape, the other in which the entire vulval ring is symmetrically involved. In my series of 40, nine were localized and the remaining 31 were of the symmetrical or complete type. Of these 31 symmetrical cases, the area involved in twelve instances did not reach beyond the posterior commissure, whereas in the typical cases, 19 in all, the leucoplakia extended from the mons veneris to the peri-anal skin inclusive.

Age.—The accompanying table clearly shows leucoplakic vulvitis is essentially a disease of old age.

TABLE

20-30	30-40	40-50	50-60	60-70	70-80	80
1	5	3	8	14	9	1

Sixty per cent of the women were over sixty years old. Of the six who were under forty, four merely had patches of leucoplakic vulvitis and one was an artificial menopause after a hysterectomy. That leaves but one case out of forty in which a typical complete leucoplakic vulvitis developed in a woman before the menopause period.

All but nine of the women had had one or more children, five of them were nullipara, and four were virgins.

Pruritus.—In only one patient was pruritus absent and in a few others it was only mild. As a rule, however, it was constant and unbearably severe. In 6 instances the pruritus had existed for less

than a year before the patient consulted me. In 20 pruritus had been noticed for from one to four years, 18 had had pruritus from five to 30 years, and in the remaining case no satisfactory answer could be obtained. As a rule, the pruritus became increasingly severe as the disease advanced though there were often long intervals in which this symptom was less pronounced, sometimes as a result of treatment



Fig. 8.—Leukoplakic vulvitis (first stage). Typical symmetrical involvement from mons to peri-anal region.

and sometimes without any treatment whatsoever. This tendency to recurrence, after temporary relief by local measures or corpus luteum has been an added reason for favoring surgical measures in the treatment of these cases.

Gross and Microscopic Pathology.—Although leucoplakic vulvitis is a slowly progressive disease, we can, I believe, distinguish three

stages, merging one with the other. In the first stage the vulva assumes a swollen reddened appearance, at times having a moist surface and showing only here and there whitish or pinkish-white areas (Fig. 8). Microscopically at this time we find pronounced acanthosis with slight increase of the keratin layer in the epidermis while in the connective tissue there is marked round cell infiltration with occasional leucocytes especially in the papillary spaces. In the second stage of the disease, appearing usually not until about one year has elapsed we find a markedly thickened, white skin with stiff edges and often excoriated from scratching. Microscopically we see pronounced

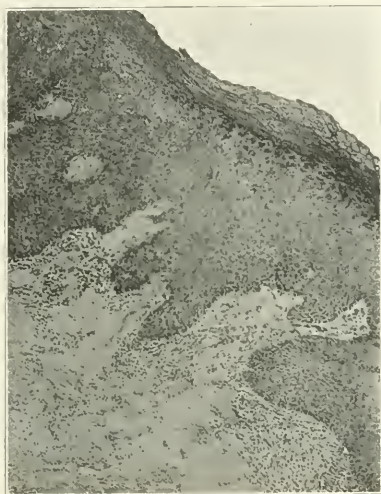


Fig. 9.—Leukoplakic vulvitis (second stage). Marked hyperkeratosis, increase of eleidin cells, acanthosis, round cell infiltration and collagenic changes in the dermis.

changes in the epidermis. The acanthosis is still marked but there is also a piling up of the keratin layer and a thick deeply staining layer of eleidin cells. The connective tissue shows the picture of chronic inflammation with here and there a collagenous appearance. Numerous plasma cells are present (Fig. 9).

In the third stage the skin has assumed the appearance of thin parchment, pearly white, crackled and dry. The epithelial layer is low, papillary processes are absent, the keratin layer usually a half or a third as thick as before, the eleidin cells less numerous and a peculiar frayed out appearance of the basal cells of the epidermis. In the connective tissue we see a glairy looking collagenous material

replacing the connective tissue, with here and there islands of round cell infiltration.

Characteristic of all three stages is the absence of elastic tissue in the subepithelial layers of the dermis. This absence of elastic fibers becomes increasingly marked as the disease progresses.

It is this absence of elastic tissue that I believe is primarily responsible for the disease. My explanation of its etiology would be as follows. In some women at or after the menopause or through some special disturbance of ovarian secretion there occurs a complete disappearance of elastic tissue in the upper layers of the vulval skin about the introitus. This loss of elasticity leads to greater friability, so that minute breaks of continuity readily occur. Through such cracks bacteria gain entrance to the dermis and produce a low grade inflammation. The exudate thus resulting causes pruritus. This, in turn, through the traumatism of rubbing or scratching, produces more cracks and more infection, and so the vicious circle progresses until the characteristic changes above described have been produced.

Cancer may develop at any of the three stages, but is most frequent and most malignant when it originates in the second stage, that of epithelial hypertrophy. In the third stage if a cancer appears, it is often everted in type, slow in growth and runs a relatively benign course.

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(For discussion, see p. 495.)

THE PREVENTION OF FETAL ASPHYXIA*

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THE physician, engaged to take charge of an obstetric patient throughout pregnancy, assumes a responsibility distinctly greater than that pertaining to any other type of practice. He becomes responsible for two patients and accordingly must bear in mind, at all times throughout pregnancy and labor, that the purpose and object in view is not alone to safely relieve the mother of her burden in due time and restore her to normal activity, but to achieve the end and object of the whole process—that the child shall be born alive and with as good prospects of development as it is scientifically possible to attain.

An increasing sense of this dual responsibility has found its expression in prenatal care, whereby the mother, and through her, the child, are given closer supervision throughout the period of intra-uterine development. However, a discussion of what constitutes efficient prenatal care and the benefits that are to be derived from it

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for both mother and child, would amplify this paper far beyond the scope of its title, and it is rather my purpose to emphasize those factors which predispose to asphyxia of the child during labor, and stress the diagnosis of threatened asphyxia and the means of prevention.

Asphyxia of the child during labor is unquestionably one of the greatest causes of stillborn but otherwise healthy appearing infants, and it is likewise true that in many instances, the gravity of the complication predisposing to or causing the asphyxia, is such that it cannot always be prevented.

A consideration of the various etiological factors causing asphyxia of the child during labor, is necessary to a proper understanding of the possibilities of prevention. The child, during intrauterine life, may be said to breathe through the lungs of its mother, through the medium of her blood. The oxygen and carbon dioxide as well as other chemical products of waste and nutrition pass through the thin walls of the villi of the placenta. The respiratory center in the medulla of the fetus normally does not stimulate breathing efforts until at the moment of birth when contraction and retraction of the uterus separate the placenta and so diminish the maternal blood flow to the placental site that the carbon dioxide content of the fetal blood is rapidly increased. There may also be some stimulation of the respiratory center from the chilling of the body surface and the external stimulation that takes place at birth, but the principal factor is the increase in concentration of carbon dioxide in the fetal circulation.

In general, therefore, the cause of asphyxia of the child during labor is an increase in carbon dioxide content of the fetal blood with resulting stimulation of the respiratory center and premature efforts at respiration.

The causes leading to an increase in carbon dioxide concentration in the fetal blood may be classified as maternal and fetal. Among the maternal causes are those affecting the character of the mother's blood or limiting the supply of blood to the placental area, as, for example, pneumonia or far advanced tuberculosis whereby there is an insufficient absorption of oxygen and elimination of carbon dioxide, which automatically increase the carbon dioxide content of the fetal blood. Cardiac decompensation may have the same effect on account of a failing circulation; likewise an advanced state of anemia or poisons in the maternal circulation as uremic poisoning, drugs or anesthetic agents. Too frequent, too prolonged or tetanic contractions of the uterus may result in such a stagnation of the maternal circulation at the placental site through the hemostatic action of the contracted uterine muscle, that proper interchange of oxygen and carbon dioxide cannot take place and asphyxia results.

The injudicious use of pituitrin accounts for many cases of asphyxia during labor.

Among the fetal causes are those affecting the placenta and the fetal circulation through the cord. Premature separation of a normally implanted placenta, placenta previa, direct compression of a low-lying placenta by the head, pathologic changes in the placenta as a result of extensive infarcts or syphilitic infection interrupt the exchange of oxygen and carbon dioxide and lead to asphyxia, either gradually or suddenly. Direct pressure on, or constriction of the umbilical cord by knots, coils, twists or prolapse is a frequent cause. Finally, the external pressure on the head itself by a tight, contracted pelvis during labor, or severe or prolonged compression of the head by forceps, or internal compression of the medullary centers by intracranial hemorrhage, may produce asphyxia of the child during labor.

The diagnosis of threatened asphyxia of the child during labor can be made if the physician follows the fetal heart sounds by frequent auscultation. A gradually increasing concentration of the carbon dioxide in the fetal circulation, brought about by one or more of the various etiological factors previously mentioned, stimulates the vagus inhibitory center of the heart, in the medulla and produces a slowing of the fetal heart rate for some time before the stage of respiratory center stimulation and asphyxia is reached.

The normal range of the fetal heart rate during labor is from 120 to 160. It is not unusual to find the heart rate temporarily accelerated from 160 to 200 or temporarily slowed from 120 to 100. However, a heart rate, either temporarily or persistently accelerated above 160 does not, in my opinion, have the serious significance during labor which a temporary or persistent slowing below 120 indicates.

It is unfortunate that the diagnosis of threatened asphyxia is based, in many textbooks and in some of the medical literature, both on abnormally slow and unusually rapid fetal heart tones. It is confusing and misleading to attempt to harmonize these conflicting statements. Theoretically, the vagus center, after a long continued primary stimulation from an increased carbon dioxide content in the fetal blood, becomes paralyzed with the result that the previously slow heart sounds become abnormally rapid (180 to 200 or above). Practically, however, such an effect I have never seen. The simplest form of temporary stimulation of the vagus, with resulting slowing of the fetal heart rate to perhaps 110 or 100, is found during the labor pain, as a result of the temporary stagnation of the maternal circulation at the placental site by the contracting musculature of the uterus. However, this temporary slowing is immediately followed by a more rapid, normal rate, as soon as the uterus relaxes. If the etiological factor is of such a nature that the carbon dioxide content of the

fetal blood is gradually and continually increased, it is noticed that the fetal heart sounds do not recover their normal rate between pains, but tend to become persistently slowed, below 100, and may be found as low as 40 or 50 per minute. The slowing continues to be more marked during than between contractions.

As the tendency to asphyxia increases, there is apparently a stimulation of the intrinsic nerve mechanism of the intestinal musculature, which results in stimulation of intestinal peristalsis and expulsion of meconium in the amniotic fluid. The appearance of greenish or dark meconium-stained amniotic fluid during labor with a vertex presentation, practically always indicates a tendency to asphyxia, but is almost always a physiological phenomenon and of no pathological significance in breech presentation.

After a period of continued persistent slowing of the fetal heart, the concentration of carbon dioxide and lack of oxygen stimulate the more resistant respiratory center and the infant begins to make respiratory efforts, which become spasmodic and accompanied by violent convulsive movements if air is not obtained. These spasmodic violent movements may frequently be seen and interpreted, if the head is beginning to crown.

If the birth of the baby does not occur until asphyxia is almost complete, there may be such a severe degree of injury to the medullary centers that all means of resuscitation prove to be of no avail. The heart may be made to increase from a very slow, weak, almost imperceptible impulse to rapid, strong pulsations by administering oxygen through mouth-to-mouth breathing or by means of an oxygen tank. In many instances, however, irreparable damage has been done to the vital nerve centers and the infant makes no voluntary effort to breathe. In these cases, it has been my observation, that the heart rate invariably becomes slower and slower and death of the infant occurs at the end of a series of very slow, weak pulsations and is not associated with a terminal, very rapid heart rate.

I would, therefore, particularly emphasize the fact that rapid, fetal heart tones are of no pathological importance in the diagnosis of either a threatened or an advanced state of asphyxia of the child during labor, but that slowing of the fetal heart tones below 120 is of the greatest significance.

Auscultation of the fetal heart sounds during labor has been greatly facilitated in recent years by the use of the De Lee head stethoscope, which represents a most valuable addition to the obstetrician's equipment. The principal advantage of this instrument over the ordinary Bowles or Ford model, for obstetrical use, are found in its adaptation to be held on the head ready for use at any time even though the operator may be "scrubbed up," and also in its increased power of

conducting the fetal heart sounds, probably as a result of some bone conduction through its rigid metal construction.

A modification of the De Lee head stethoscope has been made by G. P. Pilling and Son Co., of Philadelphia, following a suggestion that a joint, placed between the end piece and the head piece, would permit a better adjustment of the end piece to suit different locations of the fetal heart sounds, and still not impair the distinct transmission of the sound. In listening to the heart sounds when the back of the fetus is toward the flank, one finds, with the rigid connection, that it is necessary to stoop and extend his head into an awkward position, to hear the heart sounds, and if he wishes to auscultate on the opposite side of the abdomen he must either go around to the other side of the bed or else turn the patient on her side, toward



Fig. 1.—Use of the modified DeLee head stethoscope adjusted for auscultation on the far side of the abdomen.

him. The adjustable joint, however, enables one to change the direction of the end piece and auscultate over any portion of the abdomen with ease and with no diminution in sound transmission. The rubber tubing if too short, or too stiff, does not allow a sufficiently free excursion of the end piece and may strain the ears. It should be of a soft, flexible quality, preferably handwrapped stethoscope tubing, lumen 4 mm. in diameter, wall 2.5 mm. in thickness and each piece should measure 7 inches in length.

During the first stage of labor the fetal heart sounds should be followed every hour or oftener if possible, and if there is any slowing noticed, particularly between pains, so that the rate falls to between 100 and 120, auscultation should be continued over a period of several labor pains, both during and between the contractions to determine whether the slowing is merely temporary or tends to be persistent. A temporary slowing of this degree (120-100) is often

noticed during a uterine contraction, but if due solely to this, the rate increases promptly to normal limits between contractions. If there is some more serious factor at fault, the fetal heart rate may increase slightly between pains but fails to come back to the lower limit of normal (120).

It then becomes necessary to follow the fetal heart sounds at close intervals and discover the cause if possible. An examination bearing upon the various possible factors, may indicate the reason for the threatened asphyxia and point to the proper treatment. If the cause can be removed, this should be done. If it is not possible to remove the cause or deliver the patient promptly, the life of the fetus may be prolonged by administering oxygen to the mother as recommended in Shears' *Obstetrics*, until effective treatment can be carried out. Too rapid and prolonged uterine contractions may require the temporary administration of a small amount of anesthetic to relax the uterus and re-establish circulation at the placental site. Pituitrin should not be given without first ascertaining whether the fetal heart rate indicates any tendency to asphyxia and it is not wise to give it unless the dilatation and progress have reached such a stage that the child could be promptly delivered if necessary. The treatment indicated will depend not only on the nature of the factor producing asphyxia, but also on the stage of labor. In some cases in proper surroundings cesarean section may be indicated, in other cases version or forceps.

As to an overdosage of drugs such as morphine, hyosine or anesthetic agents, it has seemed to me that there is no noticeable effect on the infant's heart rate while it is still in the uterus and dependent on the maternal circulation, but at birth the depressing action of the absorbed drug on the infant's respiratory center may be so marked that respiration may be markedly delayed or fail to be established. Such effects are apt to be seen in "twilight sleep" babies. It is not advisable to give such drugs at any time within several hours preceding the time at which the child will probably be born.

During the second stage of labor, particularly when the head reaches the perineum, the cord, which is so frequently around the neck one or more times, tends to be compressed between the back of the neck and the posterior surface of the pubic bone. This is the stage of labor during which the physician should auscultate the fetal heart sounds at intervals of 10 to 15 minutes in order to discover evidence of pressure on the cord brought about in this manner. Furthermore, in every labor it is always best to have the forceps sterilized and ready to use if necessary, from the beginning of the second stage. If this has not already been done, they should be prepared at once if the heart rate shows a tendency to remain persistently from 120 to 100 per minute. If the heart rate becomes less

than 100 the patient should be brought to the edge of the table or bed, in position for forceps delivery and the anesthetic should be in readiness to be used at once if necessary. If the heart rate persists below 100 and tends to go still lower, a forceps delivery should be done without delay. These precautions and measures of preparedness may save the infant's life. Failure to have the forceps ready and the patient in position ready to be anesthetized at once, may result in failure to save the infant, even though the diagnosis may have been made by discovering a slowing heart rate. The necessity for immediate forceps delivery becomes more urgent if, in addition to abnormally slow heart sounds, the partially crowned head of the baby is seen to extend in sudden, spasmodic motion, irregularly or rhythmically, indicating violent efforts on the part of the baby to obtain air. Meconium stained fluid is not likely to be seen at this stage due to the fact that the head completely blocks the canal from above. If forceps are not at hand or prepared, immediate anesthesia induced by rapid deep breathing, and delivery by episiotomy and forcible pressure on the fundus is indicated. Pituitrin is of doubtful use in such an emergency as its action is not sufficiently prompt and, furthermore, might increase the asphyxia.

Auscultation of the fetal heart sounds late in the second stage of labor, when the head has reached the perineum, will frequently show a moderately slow rate, varying from 120 to 100, probably due to the increased pressure of the close pelvic outlet on the baby's head, the more frequent and prolonged contractions preceding birth, the bearing down efforts of the mother, and the beginning diminution of the placental site from retraction and contraction of the muscle of the fundus. One should not interfere hastily, on noting this moderate degree of slowing of the heart rate (120 to 100), but should continue auscultation at 5 to 10 minute intervals, meanwhile making preparations to interfere should the rate persist below 100, with tendency to become slower and slower.

The following abstracts of cases taken from personal records illustrate the practical value of a close observation of the fetal heart sounds during labor.

CASE 1.—Mrs. P. C., primigravida, went into labor at full term, 4 A. M., March 11, 1922, following a normal, uneventful pregnancy. Her general physical condition was good, and the pelvic measurements were normal. The presentation was O.R.A. The uterine contractions occurred at five minute intervals, gradually lessening to two or three minutes and increasing in severity during the forenoon. The membranes ruptured at 2 P. M., and the fluid at that time showed no meconium. Auscultation of the fetal heart at 7 A. M., showed it to be 120 per minute, strong and regular. However, at 10 A. M., it was noted that the rate diminished to 60 per minute during the pains but returned quite promptly to 120-140 between pains. A vaginal examination showed the cervix dilated about 3 cm., and no presentation or prolapse of the cord in advance of the head, which had by this time, descended

to just above the ischial spines. The patient had been taking nitrous-oxide-oxygen analgesia during the preceding half hour, with considerable relief. There seemed to be no factor to account for the slow heart rate during pains, other than possibly a coil of cord around the neck or else a loop of cord low enough to be pressed against the lateral pelvic wall. At 2 P. M., a vaginal examination showed the cervix fully dilated and the head low and completely rotated. Up to this time, frequent auscultation of the heart sounds showed the same characteristics—a decrease in rate to 60 during pains, but a fairly prompt recovery to 120 to 130 between pains. The forceps were sterilized and the patient prepared for delivery, should interference become necessary. At 2:30 P. M., there was a definite failure of the heart sounds to recover their normal rate between pains and within another half hour the heart rate remained below 100 both during and between pains. A low forceps delivery was done at once under ether anesthesia, and following the birth of the head there escaped a large amount of meconium-stained amniotic fluid, which had previously been held back by the head. A single coil of cord was around the neck. The baby was born at 3:10 P. M., and attempted to breathe before delivery of the shoulders. The cry was somewhat delayed but no active measures of resuscitation were necessary. The cord presented a very unusual condition in that there was an almost total lack of Wharton's jelly, leaving the large umbilical vein and arteries entirely unprotected and consequently very subject to compression between the neck and the pubic bone.

CASE 2.—Mrs. A. K., primigravida, went into labor at full term Sept. 14, 1922, about 10 P. M. There had been no complications during pregnancy and her general physical condition and pelvic measurements were normal. The presentation was O. L. P. Throughout the first stage the fetal heart sounds remained normal 130 to 140, and the uterine contractions occurred at 3 minute intervals but, were not very severe. The membranes ruptured spontaneously at 12:30 P. M., Sept. 15, and there was no meconium in the discharge. At 1:30 P. M., a rectal examination showed the cervix fully dilated, the head on the perineum and the occiput anterior. Nitrous-oxide-oxygen analgesia was given from 12 noon almost up to the time of delivery. On account of inefficiency of the pains and failure of the slightly crowned head to advance, 3 minims of pituitrin were given at 2:10 P. M., but with very little effect on the contractions. Auscultation of the fetal heart at 2:20 P. M., showed a marked slowing of the rate to 70, which up to that time had been 130 to 140 on repeated counts. Preparations were made to interfere quickly if necessary. The heart rate which for a time tended to increase somewhat between pains, soon persisted at a low rate between as well as during the pains and at 2:35 P. M., the partially crowned head was seen to make sudden, spasmodic movements as though the baby was trying to breathe. The forceps were immediately applied, with the patient under nitrous-oxide-oxygen anesthesia, an episiotomy was done, and the baby delivered at 2:40 P. M. On delivery of the head, there was found a loop of cord prolapsed alongside of the body and neck. The baby was a 7¾ pound male infant, and born in a condition of pallid asphyxia. The heart beat was about 36 per minute and very weak. Simple methods of resuscitation were of no apparent value, but after about 15 minutes of mouth to mouth artificial respiration, the baby began to breathe and was soon in fairly good condition, and continued to be normal.

SUMMARY

The double responsibility of obstetric practice demands that the physician give due regard to safeguarding the life of the child during labor as well as during pregnancy. Death of the child during

labor is practically always due to asphyxia, brought about by various maternal and fetal causes, some of which act slowly and are preventable, while others are so rapid in their action that little opportunity is given for treatment.

A lack of oxygen and an increase in carbon dioxide in the fetal blood causes a stimulation, first, of the cardio-inhibitory center in the medulla, which results in a decrease of the fetal heart rate. Later on, the respiratory center is stimulated, and with ineffectual efforts to breathe, asphyxia results. A fetal heart rate temporarily slowed, not lower than 100, during pains, but increasing to normal rate between pains, is a sufficient indication to follow the heart rate more frequently, discover the cause if possible, and make preparations for interference, if required. A fetal heart rate persistently below 100, both during and between pains, demands prompt delivery of the baby if this can be done without great risk to the mother. A rapid heart rate does not indicate either a threatened, or an advanced state of asphyxia.

The diagnosis of threatened fetal asphyxia is facilitated by use of the De Lee head stethoscope. The adjustable model made by Pilling & Co., is better adapted to all positions. It should be used at frequent intervals during the second stage of labor, when compression of the cord, coiled about the neck or partially prolapsed, against the pubic bone, occasionally produces asphyxia. Prompt delivery of the baby, under such circumstances, may prevent death from asphyxia.

20 PONCE DE LEON AVENUE.

THE CALCIUM AND MAGNESIUM CONTENT OF THE BLOOD SERUM DURING PREGNANCY, LABOR AND THE PUERPERIUM

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WE have recently been led to undertake the study of certain of the more obscure problems of the physiology of gestation in order better to attack the subject of the toxemias of pregnancy and, with this in mind, have examined the calcium content of the blood serum of 205 normal nonpregnant, pregnant, parturient and puerperal women to determine the usual physiological variations incident to gestation. Whenever possible, we have also made observations upon patients suffering from the toxemias of pregnancy. During one period of the study a considerable number of magnesium determinations were made, but when no very striking variations from normal were found, this work was largely abandoned.

Among the many theories which have been advanced to explain the occurrence of eclampsia, is that of calcium deprivation of the mother incident to her need for supplying large quantities of this mineral to the various tissues of the developing fetus. The magnitude of this demand has been determined through the analysis of fetuses at the different months of intrauterine development by Michel,¹ Camerer, Söldner and Herzog,² Givens and Macy,³ and others. These observers all agree that a full term fetus contains from 20 to 30 grams of calcium and approximately 1 gram of magnesium. The maternal organism must, therefore, have an average positive balance during pregnancy of approximately 100 mg. calcium and 4 mg. magnesium per day, if the fetal demands are to be met without any withdrawal of the body's fixed reserves.

The inorganic needs of the fetus are practically insignificant until about the middle of pregnancy, but from that time progressively more calcium and magnesium are necessary for fetal growth. Consequently, the danger of a real deprivation is greater as term is approached, and would in fact seem inevitable unless the maternal metabolism were conducted more economically than at other times, or unless the diet provided an unusual quantity of these elements. We have succeeded in finding only one calcium and magnesium balance experiment in the available literature, that of Hoffström⁴ published in 1910. This author studied one normal patient from the seventeenth week of pregnancy to the time of delivery and concluded that the metabolism of

the organism so adapted itself to the altered requirements of gestation that, even upon an ordinary diet, there was no sacrifice entailed by the necessity for supplying the building stones for the fetus. In the case of all the elements studied—nitrogen, sulphur, phosphorus, calcium and magnesium—a positive balance obtained almost from the beginning of the experimental period and the storage became more pronounced as term was approached. In consequence of this economy, the ingested food not only supplied all the materials needed for development of the product of conception, and the coincidental hypertrophy of the uterus and breasts, but in each instance there was still a positive balance accruing to the rest of the body, supposedly in anticipation of the demands of the lactation period. Improved assimilation and diminished excretion apparently play the leading rôles in this adaptation.

This work certainly argues against a physiological mineral deprivation of the organism as a whole during pregnancy, but does not actually disprove the idea that a lowered blood calcium may be a part to its various pathological manifestations. Moreover, the demonstrated association of diminished blood calcium with tetany and the fancied resemblance of this disease to eclampsia, together with the efficiency of calcium therapy in the treatment of the former, have revived the theory and stimulated many workers. Within the past few years several authors, including Drennan,⁵ Oliver,⁶ Halford,⁷ Oettingen,⁸ Loew,⁹ and others have advocated the hypothesis upon purely theoretical grounds, or upon the clinical results of calcium administration or dietary regulation. The latest of these, Oettingen,⁸ has most attractively combined a supposed calcium deficiency with Zangemeister's *hydrops gravidarum* theory¹⁰ and Fischer's conception of edema¹¹ to explain the disease upon the basis of physico-chemical changes, but has failed to advance any proof of his contention.

On the basis of this hypothesis, attempts have likewise been made to produce eclampsia-like conditions in experimental animals by reducing the blood calcium by means of chemical agents. Burekhardt-Socin¹² lowered the calcium in the circulating fluid by intravenous injections of oxalate radicals and described clinical disturbances which bore some resemblance to eclamptic manifestations. This work has not been confirmed, and, moreover, the mere demonstration of such results is of little value unless similar alterations in blood calcium are found in puerperal eclampsia to substantiate the conclusions, which can be so easily drawn from laboratory experience alone.

NORMAL VARIATIONS IN SERUM CALCIUM AND MAGNESIUM DURING THE REPRODUCTIVE CYCLE

Actual analyses of the blood for calcium (and magnesium) during normal pregnancy have been reported during the past few years, but

the results are too divergent to be conclusive. The older analytical procedures either required such large quantities of blood as to make repeated determinations impracticable (ashing, precipitation of the calcium as oxalate, and filtration, followed by permanganate titration or weighing as calcium oxide), or gave such varying results that their accuracy must be suspected (Blair-Bell's method of counting the calcium oxalate crystals in diluted blood after the addition of an oxalate solution).

With these methods the results were, for the most part, unsatisfactory. Lamers¹³ reported an increased plasma calcium during pregnancy with a considerable further rise at the time of labor, and a postpartum drop to the pregnancy level, where the values remained during lactation. Kehrer¹⁴ in 1913 stated that in normal pregnancy he had found the whole blood calcium somewhat increased, but that blood samples taken nine or ten days after delivery showed a considerable decrease. He attributed the puerperal diminution to blood lost at the time of labor, to lactation and to a calcium poor diet. Linzenmeier¹⁵ and Aymerich¹⁶ in the same year, confirmed Kehrer's finding with regard to the calcium increase in whole blood during the second half of pregnancy, but made no determinations upon puerperal patients. Jansen¹⁷ found practically no change in the whole blood calcium during any part of the reproductive cycle, although the tendency was toward an irregular increase. Meigs, Blatherwick and Cary¹⁸ were likewise unable to detect any variations in the calcium content of the plasma of cows during pregnancy or lactation. On the other hand, Morley,¹⁹ using the Blair-Bell technic in 1913, concluded that " * * * there is a lessened amount of calcium in the blood of pregnant women and of women in labor."

Kehrer,²⁰ in 1920, repeated his earlier work upon whole blood and came to quite different conclusions, which were later confirmed by Mazzocco and Moron.²¹ Kehrer found that the values during late pregnancy, at the time of labor, and in the early lactation period are generally somewhat below normal, although not infrequently normal concentrations obtain. He says that, "One may, therefore, speak of a low degree of physiological deprivation in the organism at the end of pregnancy and in the early puerperium * * *"; and, furthermore, offers three possible explanations for the observed changes: (1) the physico-chemical properties of the blood become altered so that the calcium salts are less readily soluble than in the nonpregnant state, (2) the blood becomes diluted, (3) calcium assimilation is retarded in some unknown way.

Since it is known that the corpuscles contain practically no calcium, it would seem that the analyses of serum or plasma would give more useful information, particularly when it is remembered that

the percentage volume of cells in whole blood is subject to marked physiological variations. It seems probable that little or no calcium is used up in the process of clotting and that the calcium content of plasma and serum is, therefore, practically identical. Following the appearance within the past four years of more accurate methods of analysis upon small samples of serum or plasma, certain other publications upon the subject have appeared, the majority of them since this work was begun.

Hess and Matzner²² determined the serum calcium by Lyman's method and in 11 antepartum specimens found an average of 10.4 mg. per 100 c.c. while in 18 early postpartum samples the average was 9.75 mg. per 100 c.c. Since no normal control figures are given, it is impossible to say whether there is an appreciable change attributable to pregnancy, although a comparison with the generally accepted normal values would indicate that there is no significant alteration. On the other hand, their figures show a relative diminution in the first 48 hours after delivery, even though the absolute quantities are open to criticism by reason of the demonstrated inaccuracies of the method employed.

De Wesselow,²³ using the Kramer-Tisdall method,²⁴ examined the sera of 17 normal nonpregnant women, 32 normal pregnant women from the third to the ninth month of gestation, and 22 puerperal patients (9 early and 13 late). The average values during pregnancy were all slightly lower than in the nonpregnant controls, indicating a definitely lower trend for the serum calcium during this period, but only in the six-to-seven-months period was the average below the normal limits, and in every group there were samples in which the calcium was quite normal. In both the early and late puerperium, the calcium values were normal, but it should be noted that no specimens were obtained during the first two days after delivery.

Krebs and Briggs²⁵ recently reported some studies of the organic and inorganic blood constituents in 17 normal pregnant women and conclude as follows: "The results * * * show a great constancy of all the elements in normal pregnancy, regardless of the period of gestation, with one exception, namely, that in the last weeks of pregnancy our few cases showed the calcium content to be slightly lowered." They found the calcium of the plasma or serum to vary from 7.5 to 10.0 mg. per 100 c.c., while the magnesium ranged from 2.1 to 2.7 mg. per 100 c.c.

Leicher,²⁶ in 3 cases of normal pregnancy at the third and fourth months, found the serum calcium to be normal, while among 10 women nearly at full term 5 showed normal values, 2 were in the lower range of normal and 3 were distinctly low, and in 9 puerperal patients 6 were normal and 3 were subnormal. These values must

be considered only as comparable within themselves, since the absolute values are considerably higher than those usually accepted as normal.

There is thus seen to be a certain divergence of opinion as regards the normal variations of blood calcium during reproduction and, moreover, the individual authors have reported series of cases altogether too small to permit of general deductions, or have employed analytical methods which are open to criticism, while magnesium determinations seem not to have been attempted except by Krebs and Briggs.²⁵

Under these circumstances, it seemed advisable for us to undertake a more extended series of observations upon the calcium and magnesium content of the serum during normal pregnancy, at the con-

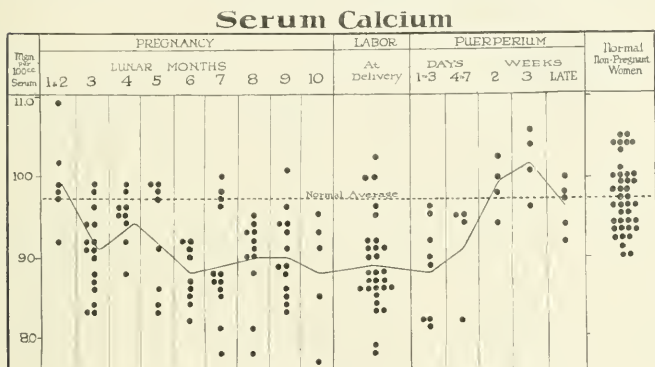


Fig. 1.

clusion of labor, and at various periods after delivery. We have, therefore, determined the serum calcium in 40 normal nonpregnant women controls, 105 normal pregnant women fairly evenly distributed from the fifth to the fortieth week of pregnancy, 29 women at delivery and 31 from twelve hours to twelve weeks postpartum; and the serum magnesium in 16 normal nonpregnant women in the child-bearing age, 29 during pregnancy, 23 at the end of labor and 18 during the postpartum period.

EXPERIMENTAL

The blood samples were collected from an arm vein and allowed to clot, after which the clear serum was separated by centrifugalization. The calcium was determined by the direct precipitation method of DeWaard²⁷ as modified by Kramer and Tisdall,²⁴ while

the magnesium determinations were made by a combination method recently described by us,²⁸ which gives values comparable to those of the procedures generally employed. All determinations were made in triplicate and every precaution was taken to insure their accuracy.

The calcium values obtained are presented in Table I, while Figure 1 is a graphic representation of the same data in which individual determinations are represented by dots, in order that the occurrence of exceptional cases may not be lost sight of, as so often happens when only average values are recorded. The continuous line connects the average values in each period and shows the general trend of the concentration of calcium in the serum during the various stages of the child-bearing period. The figures for healthy nonpregnant women are introduced for comparison, and in Fig. 1 the dotted horizontal indicates the average of these forty determinations.

TABLE I
SERUM CALCIUM IN NORMAL PREGNANCY, LABOR AND PUERPERIUM

SUBJECTS	NUMBER OF DETERMINATIONS	SERUM CALCIUM	
		AVERAGE	RANGE
Normal nonpregnant women	40	mg. per 100 c.c. 9.7	mg. per 100 c.c. 9.0-10.6
Pregnancy			
1-8 weeks	7	9.9	9.2-10.9
9-12 "	19	9.1	8.3-9.9
13-16 "	12	9.4	8.8-9.9
17-20 "	11	9.1	8.3-9.9
21-24 "	11	8.8	8.2-9.2
25-28 "	15	8.9	7.8-10.0
29-32 "	11	9.0	7.8-9.5
33-36 "	14	9.0	8.3-10.1
36-40 "	5	8.8	7.7-9.5
At the time of delivery	29	8.9	7.8-10.3
Postpartum			
1-3 days	8	8.8	8.1-9.6
4-7 "	7	9.1	8.2-9.5
8-14 "	7	9.7	9.4-10.3
15-21 "	4	10.2	9.6-10.7
more than 21 days	5	9.6	9.2-10.0

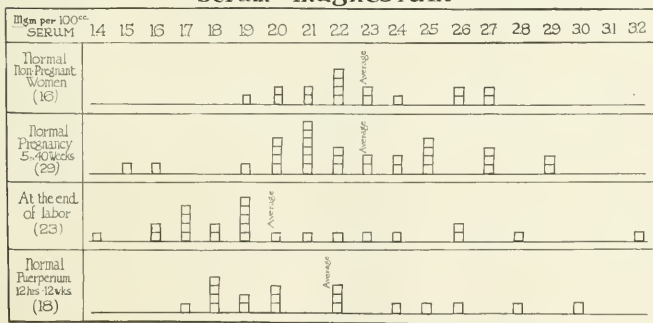
It should be noted that after the second month of pregnancy the serum calcium tends to be somewhat lowered, although occasionally it may even be slightly above the normal average. As term is approached these exceptions become less numerous and are quite unusual at the time of labor. During the last five lunar months of pregnancy the average serum calcium values never exceed the lower limit for normal as found in our series of nonpregnant women (9.0 mg. per 100 c.c.), and are consistently maintained at a level considerably lower than the average for normal nonpregnant women.

At the end of labor and during the first three days of the puer-

TABLE II
NORMAL SERUM MAGNESIUM VALUES

SUBJECTS	NUMBER OF SPECIMENS	AVERAGE VALUE	RANGE OF VALUES	INDIVIDUAL DETERMINATIONS					
Healthy nonpregnant women	16	mg. per 100 c.c. 2.29	mg. per 100 c.c. 1.9-2.7	mg. per 100 c.c. 1.9 2.0 2.0 2.1 2.1 2.2 2.2 2.2 2.2 2.3 2.3 2.4 2.6 2.6 2.7 2.7					
Pregnant women	29	2.26	1.5-2.9						
1-8 weeks	4	2.35	1.6-2.9	1.6	2.2	2.7	2.9		
9-12 "	5	2.04	1.5-2.4	1.5	2.0	2.1	2.2	2.4	
13-16 "	3	2.13	1.9-2.5	1.9	2.0	2.5			
17-20 "	2	2.50	2.1-2.9	2.1	2.9				
21-24 "	2	2.45	2.4-2.5	2.4	2.5				
25-28 "	4	2.33	2.0-2.7	2.0	2.1	2.5	2.7		
29-32 "	5	2.38	2.1-2.7	2.1	2.3	2.3	2.5	2.7	
33-36 "	3	2.10	2.0-2.2	2.0	2.1	2.2			
37-40 "	1	2.10	2.1	2.1					
At the end of labor	23	2.03	1.4-3.2	1.4	1.6	1.6	1.7	1.7	1.7
				1.7	1.8	1.8	1.9	1.9	1.9
				1.9	1.9	2.0	2.1	2.2	2.3
				2.4	2.6	2.6	2.8	3.2	
Puerperal women	18	2.16	1.7-3.0						
1-3 days	3	2.03	1.7-2.6	1.7	1.8	2.6			
4-7 "	2	1.80	1.8	1.8	1.8				
8-14 "	4	2.43	2.0-3.0	2.0	2.2	2.5	3.0		
15-21 "	5	2.26	1.9-2.8	1.9	2.0	2.2	2.4	2.8	
more than 21 days	4	1.98	1.8-2.2	1.8	1.9	2.0	2.2		

Serum Magnesium



Each square indicates a single blood specimen.

FIG. 2.

perium, the average values for serum calcium are very similar to those found in later pregnancy. In individual cases there seems to be a tendency toward a slight increase at the time of labor, followed immediately by a fall, but this is only weakly reflected in the average values. During the latter part of the first week postpartum, there is an appreciable rise in the curve, and a normal serum calcium seems

to have been restored by the second week, the rate of recovery varying with individual patients. Some tendency toward over-compensation may be indicated by the high values obtained during the third week of lactation but the number of cases is too few to be conclusive. It would seem, however, that the continuance of lactation is not associated with a high serum calcium, as evidenced by the normal figures obtained in the late puerperium.

The serum magnesium values (Table II and Fig. 2) obtained upon 70 obstetrical patients ranged from 1.4 to 3.2 mg. per 100 c.c., while the average figures varied from 1.8 mg. per 100 c.c. in the latter part of the first week postpartum to 2.5 mg. in the fifth month of pregnancy, as against 2.3 mg. per 100 c.c. in the 16 normal nonpregnant women. Of the values obtained during pregnancy, 21 of the 29 were between 2.0 and 2.5 mg. per 100 c.c. (Fig. 2), whereas during labor 13 out of 24 were between 1.6 and 1.9 mg. per 100 c.c., with the others scattered over a wide range, and during the puerperium 12 out of 18 were between 1.8 and 2.2 mg. per 100 c.c. Among the 16 normals, 11 lay

TABLE III
NORMAL SERUM CALCIUM AND MAGNESIUM: REPEATED DETERMINATIONS UPON INDIVIDUAL CASES

PATIENT	DATE	PERIOD	CALCIUM	MAGNESIUM
			mg. per 100 c.c.	mg. per 100 c.c.
H.	1-20-23	36 wks. preg.	9.4	2.2
	2-20-23	At delivery	9.1	1.8
D.	12-19-22	24 wks. preg.	8.6	..
	4-19-23	9 d. p.p.	9.4	..
C.	1-13-23	25 wks. preg.	8.8	2.0
	4-19-23	10 d. p.p.	9.4	..
M.	2-15-23	At delivery	8.5	1.8
	2-17-23	2 d. p.p.	9.6	1.7
H.	2-14-23	At delivery	8.8	1.7
	2-17-23	3 d. p.p.	8.9	1.8
G.	1-25-23	At delivery	8.6	1.8
	2-10-23	16 d. p.p.	10.5	2.4
O.	2- 3-23	At delivery	8.6	1.9
	2-10-23	7 d. p.p.	9.4	1.8
A.	1- 6-23	At delivery	8.8	1.7
	1-19-23	13 d. p.p.	10.3	2.0
	3-20-23	10 wks. p.p.	9.2	..
C.	2- 5-23	At delivery	8.7	1.9
	2- 8-23	3 d. p.p.	9.2	2.6
L.	1- 3-23	At delivery	8.6	2.6
	1-19-23	16 d. p.p.	10.7	1.9
McG.	1-17-23	At delivery	9.0	1.4
	1-27-23	10 d. p.p.	9.8	2.5
C.	1-15-23	At delivery	8.4	2.4
	1-31-23	16 d. p.p.	9.6	2.8
D.	1-25-23	At delivery	8.7	2.2
	2-10-23	16 d. p.p.	10.1	2.2

between 2.0 and 2.4 mg. per 100 c.c., figures which agree closely with the few determinations previously reported for normal individuals.

When all the pregnancy magnesium figures are considered together, both the average values and the extremes are seen to correspond very closely with those of the nonpregnant women, and the *mode* is similarly situated. There is perhaps a tendency, in the last two months, for the concentration of magnesium to be slightly diminished but our figures are too few to be conclusive. At the end of labor, on the other hand, the average is distinctly lower (10 per cent) and the *mode* falls at a lower point, while during the puerperium the general tendency is toward more normal values, although the few specimens obtained in the first week after delivery are even lower than those taken at labor. In general, then, it would seem that the serum magnesium varies somewhat as does the calcium and in all probability the same factors are responsible for the observed changes. While the actual variations in the serum magnesium are small, the proportional changes are fairly comparable to those noted for calcium.

In a few instances, repeated determinations upon the same patient showed that the variations in both serum calcium and magnesium, which appeared in average figures, can usually be demonstrated also in the individual (Table III).

DISCUSSION

The interest attaching to such a demonstration of a tendency for the serum calcium and magnesium to be decreased during the latter part of pregnancy, at the time of labor, and during the early puerperium, is largely dependent upon its interpretation. It might be regarded as evidence of a certain degree of depletion of the mineral resources of the maternal organism by reason of the fetal demands, but the experiment of Hoffström⁴ offers a fairly conclusive argument against such a hypothesis. Furthermore, we have shown in recently published experiments on the maternal-fetal interchange that the fetal serum calcium is invariably equal to and may exceed the values obtaining in normal adults, while the fetal magnesium is always as high as, and may be higher than, that in the mother's serum, so that presumably the fetus is able to maintain in its circulation the optimum amount of these two minerals needed for its full development, in spite of the lowered concentration of these elements in the maternal serum. In the second place, it might be looked upon as a result of an inefficient assimilation of the ingested mineral food, but again Hoffström's balance experiment would render such a theory very improbable. Finally, it may prove to be merely a relative diminution due to actual dilution of the serum, and we are, at present, inclined to view it in this light.

There is considerable evidence that the blood volume becomes augmented during pregnancy by reason largely of an increased plasma

dilution (hydroplasma). Miller, Keith and Rowntree²⁹ demonstrated this in 1915 by their method of dye injection, and all the purely chemical studies available have tended to confirm their opinion. Stander and Tyler³⁰ found an appreciable increase in the water content of the whole blood and plasma during pregnancy. They maintain that this dilution increases gradually up to the seventh month and subsequently remains stationary or slowly decreases. DeWesselow²³ determined the total solids of the serum during the course of his experimental work and detected a progressive decrease during pregnancy, with a gradual return to normal after delivery. Except during the early days of the puerperium, however, there were occasional specimens which failed to show a diminished solid content. In general, the dilution tended to parallel the calcium values—low solid content being associated with low calcium.

Our own experience, based upon determinations of plasma and serum protein values, to be published shortly, also indicates a gradual dilution, beginning at about the middle of pregnancy and increasing up to full term, with a slight concentration at the time of labor. Following delivery there is a further rapid dilution for the first 48 hours, due apparently to an influx of water from the tissues, but from this point the plasma protein rapidly increases to normal, where it remains during lactation.

Quite usually, an appreciable edema is associated with diminished plasma or serum protein, the diminution being roughly proportional to the accumulation of water in the tissues. During this hydroplasma, the freezing point depression of the plasma is somewhat decreased, according to Zangemeister,³¹ so that a lowered osmotic pressure obtains, although there is an increase in the sodium chloride, which tends to limit the physico-chemical changes produced by the dilution. The antagonistic action of sodium and calcium ions in solution is well established, but it cannot be said with certainty that the variations in calcium concentration are due to such alterations, although such a view is well within reason. Moreover, it cannot, at present, be stated whether the blood dilution (increased water content) is the cause or effect of the inorganic salt changes. At any rate, the lowering of the serum calcium is associated with a dilution of the serum and with an increase of certain other electrolytes, e.g., sodium chloride, so that the total ionic concentration remains very little affected.

CALCIUM AND MAGNESIUM IN THE BLOOD DURING THE TOXEMIAS OF PREGNANCY

Drennan⁵ in the course of a series of articles upon the general subject of the abstraction of calcium salts, advanced the theory in 1911 that depletion of the calcium in the maternal organism is the

cause of eclampsia. She failed, however, to adduce any evidence to support such a hypothesis.

Two years previously Halford⁷ and Mitchell³² had suggested the same thing and had reported several patients with toxemia, with and without convulsions, in whom the therapeutic administration of calcium lactate was associated with marked clinical improvement. It would seem, however, that the other measures adopted might in themselves have been responsible for the disappearance of the symptoms. In fact, no conclusive clinical demonstration of the efficacy of even large doses of calcium lactate or calcium chloride in the pregnancy toxemias has yet been forthcoming, and our own experiences have been disappointing.

Oliver⁶ (1915) and Loew⁹ (1919) suggested that eclampsia may be due to some disturbance of calcium metabolism, and advised a diet rich in milk, vegetables and fruits during pregnancy, in order that a calcium deficiency might be avoided. In this connection, it is certainly not unreasonable to attribute the diminution of eclampsia in certain regions of Central Europe during the war to an increase in the consumption of mineral salts depending upon the dietary changes necessitated by the blockade, rather than to the decreased protein or fat intake, as stressed by the German writers. The beneficial effects of a straight milk diet in the pregnancy toxemias is also more probably referable to the mineral content than to any other factor, although such contentions cannot be accepted as proven facts.

Nowhere have we seen any specific reference to magnesium deficiency as a cause of the toxemias, although Rissmann³³ has advocated the rectal administration of magnesium sulphate solution in toxic patients, in order to reduce the blood pressure, and the intradural injection of the same salt following spinal puncture in eclampsia.

Several authors have recorded scattered calcium analyses of the whole blood, plasma or serum of toxemic women, but only one writer has recorded the magnesium content. Lamers,¹³ in 4 cases of eclampsia, found plasma calcium within the range obtaining in his 14 normal subjects. The absolute values (10 to 12 mg. calcium per 100 c.c.) are probably incorrect, but the relation between the various samples suggests that no essential changes appear in eclamptic women. Linzenmeier¹⁵ also found normal values for calcium in the whole blood of 5 eclamptic patients.

Kehrer^{14, 20} detected a lowering of the whole blood calcium in both nephritic toxemia and eclampsia, and stated that this condition continues during the puerperium even in spite of an almost exclusive milk diet. In certain instances, however, the values were not below those noted in normal pregnancy, so that no significant conclusions can be drawn.

Mazzocco and Moron,²¹ although they found a diminished whole

TABLE IV
SERUM CALCIUM IN THE TOXEMIAS OF PREGNANCY
HYPERTENSION

CASE NO.	MONTH OF PREGNANCY	PARA	SYSTOLIC BLOOD PRESSURE mm.	ALBUMINURIA	EDEMA	DATE	SERUM CA mg. per 100 c.c.	REMARKS
1	7 " 8 "	0 " " "	220 160 180 140	0 0 0 0	sl. 0 0 0	12-27-21 1-3-22 1-17-22 1-30-22	9.2 10.0 8.4 8.9	So-called "idiopathic hypertension." After administration of Calcium Lactate, Several days after Ca therapy was stopped. Several days after Ca therapy was re-begun.
PRE-ECLAMPTIC TOXEMIA								
2	10	0	130	+	0	1-26-22	7.3	Fetus dead.
3	10	0	140	++	slight mod.	1-30-22	9.3	Recovered completely. No return of sympt.
4	10	0	195	+++	0	2-3-22	9.2	
5	9	0	135	0	slight	2-14-22	7.9	Mild toxemia.
6	10	0	150	+++	0	2-16-22	8.4	Slightly toxic.
7	9	0	150	1.5 G. per l.	marked	2-24-22	8.9	Twins.
8	9	0	165	4.0 G. per l.	0	4-5-22	9.4	Slight visual disturbances.

TABLE IV—Cont'd.

ECLAMPSIA

CASE NO.	MONTH OF PREGNANCY	PARA	SYSTOLIC BLOOD PRESSURE	ALBUMINURIA	EDEMA	DATE	SERUM CA	REMARKS
9	9 p.p.	0	165	+++	slight	3-17-22	8.8	After 5 convulsions.
10	8	0	120	0	0	4-7-22	9.1	Recovered—21 p.p.—fasting.
	“	“	170	Abundant	mod.	4-17-22	7.8	After 6 convulsions.
11	“	“	—	“	“	4-17-22	7.8	Improved—no more convulsions—5 hrs. later.
	p.p.	—	—	—	0	4-22-22	9.3	Improved—5 days later.
	7	0	155	0	0	4-10-23	9.4	Normal pregnancy—no symptoms.
	8	“	135	40 G. per l.	marked	5-3-23	8.6	Eclampsia—after 3 convulsions.
	“	“	140	“	“	5-3-23	8.4	Eclampsia—after 10 convulsions—at venesection.
“	“	“	160	6.5 G. per l.	less	5-7-23	8.1	Eclampsia—no conv.—undelivered—no sympt.
	“	“	165	10 G. per l.	“	5-9-23	7.3	Eclampsia—no conv.—undelivered—no sympt.
	“	“	150	10 G. per l.	ascites	5-11-23	8.0	Eclampsia—no conv.—delivered 5 days later.

CHRONIC NEPHRITIS WITHOUT CONVULSIONS

CASE NO.	MONTH OF PREGNANCY	PARA	SYSTOLIC BLOOD PRESSURE	ALBUMINURIA	EDEMA	DATE	SERUM CA	REMARKS
12	9	0	210	+++	slight	1-4-22	9.6	Quite toxic.
13	6	2	—	+	mod.	1-26-22	9.6	Much improved.
14	7	“	—	+	slight	2-16-22	9.6	Not severe.
	“	0	160	1 G. per l.	0	2-25-22	8.3	Much improved.
15	“	“	—	—	0	3-2-22	9.4	Aseities. Epigastric pain.
	7	2	220	8 G. per l.	marked	4-26-22	7.2	Headache.
16	4	2	170	trace	0	5-4-22	12.2	At term—headache—no other sympt.
17	10	2	160	+	marked	1-14-23	8.7	At delivery—no change in symptoms.
“	“	“	175	0.5 G. per l.	“	1-15-23	8.4	At delivery—no symptoms—well.
	p.p.	“	110	+	0	1-31-23	9.6	16 days later—no symptoms—well.

CHRONIC NEPHRITIS WITH CONVULSIONS

CASE NO.	MONTH OF PREGNANCY	PARA	SYSTOLIC BLOOD PRESSURE	ALBUMINURIA	EDEMA	DATE	SERUM CA	REMARKS
18	10	6	165	+	slight	2-11-22	8.2	After 4 convulsions.
19	“	“	150	+	0	2-14-22	8.1	No more convulsions. Child probably dead.
	p.p.	“	—	+	0	2-21-22	9.9	Clinically recovered.
	p.p.	2	155	1 G. per l.	marked	3-29-22	8.8	4 days after delivery and convulsions.

blood calcium during pregnancy and believed that their results confirmed the decalcifying influence of gestation, were yet unable to detect any relation between the occurrence of eclamptic convulsions and the calcium content of the blood in the two cases studied.

Halverson and Bergeim³⁴ noted subnormal serum calcium values in three cases of eclampsia (8.47, 8.5 and 8.66 mg. Ca per 100 c.c.), but in a single case of pernicious vomiting obtained a normal reading of 10 mg. Similarly low calcium figures were noted in many cases of uremia, even though the urinary output of calcium was distinctly below normal, and an increase was detected when clinical improvement of the condition occurred.

Macallum³⁵ analyzed the plasma of three eclamptics and found "the calcium in two cases above normal and in one case normal; the magnesium in two cases high and in one normal."

Experimental

We have done 36 serum calcium determinations upon 19 patients suffering with various forms of late toxemia (Table IV), and 8 magnesium determinations upon 2 such patients (Table V).

In general, the calcium results were not different from those obtained in uncomplicated gestation, although 3 specimens showed a lower concentration of calcium than any of our normal samples, (Case No. 2, Case No. 11, Spec. 5, and Case No. 15). The first of these patients had no demonstrable edema, whereas the other two had pronounced swelling and ascites. Another unusual case was No. 16, an early pregnancy complicated by a severe grade of chronic nephritis, in which an extremely high value (12.2 mg. per 100 c.c.) was found.

Whenever samples were examined some days after delivery and full recovery, the serum calcium was found to have returned to the normal level, thus following the normal puerperal variations. Case No. 11, was one of interrupted eclampsia, in which labor was induced thirteen days after the convulsions had ceased, because of continued albuminuria and hypertension. Here the symptomatic improvement during the first several days was associated with a gradually diminishing serum calcium in spite of calcium therapy, a fact which argues quite decisively against any direct relationship between the convulsive manifestations and a diminution of the blood calcium. Similar conclusions were reached by Kehrer,^{14, 20} and Mazzocco and Moron.²¹

It would seem that the lowered serum calcium in the late pregnancy toxemias is susceptible to the explanation advanced in discussing normal gestation—blood dilution. There is certainly a tendency for the values to be higher when there is no edema and lower when the swelling is marked, although no absolute correlation can be made out.

Our observations upon serum and plasma protein indicate that a greater degree of hydroplasma is to be expected in toxic women,

TABLE V
SERUM MAGNESIUM IN TOXEMIC PREGNANCY
CHRONIC NEPHRITIS WITHOUT CONVULSIONS

CASE NO.	MONTH OF PREGNANCY	PARA	SYSTOLIC BLOOD PRESSURE	ALBUMINURIA	EDEMA	DATE	SERUM MG	REMARKS
			mm.				mg. per 100 c.c.	
17	10	2	160	++	marked	1-14-23	2.3	At term—headaches. At delivery—no change in sympt. 16 days later—no symptoms—well.
	"	"	175	0.5 G. per l.	"	1-15-23	2.4	
	"	"	110	+	none	1-31-23	2.8	
	P.P.							
ECLAMPSIA								
11	8	0	135	40.0 G. per l.	marked	5-3-23	2.8	After 3 convulsions.
	"	"	140	40.0 G. per l.	"	5-3-23	3.1	After 10 convulsions—at venesection.
	"	"	160	6.5 G. per l.	less	5-7-23	2.9	No convulsions for 4 days—no symptoms.
	"	"	165	10.0 G. per l.	"	5-9-23	2.9	Still undelivered—no symptoms.
	"	"	150	10.0 G. per l.	ascites	5-11-23	2.9	Ascites developed—delivered 5-16-23.

although exceptions are frequently noted. This experience is in accord with Zangemeister¹⁰ and is substantiated by the observations of Stander and Tyler³⁰ upon the water content of the blood. The latter authors found that in eclampsia or chronic nephritis complicating pregnancy the percentage of water in the whole blood or plasma may be greatly increased, the increase being roughly proportional to the extent of the general edema.

In two patients calcium lactate and calcium chloride were given during the course of treatment and in one instance magnesium sulphate was administered by rectum. No definite change in the patients' condition could be detected, and no real increase in the serum concentration of these substances was demonstrable, although at times it was felt that there was a tendency for the blood pressure to become somewhat lower following such therapeutic procedures.

The few serum magnesium determinations upon toxemic individuals quite consistently gave relatively high results (2.3 - 3.1 mg. per 100 c.c.), with no definite variations incident to the symptoms. Certainly there is in these two cases no diminution of the magnesium, and it may be that further work will confirm our findings and those of Macallum,²⁵ showing values slightly above normal.

CONCLUSIONS

1. Analyses on 105 normal pregnant women showed a definite and consistent tendency toward a lowering of serum calcium during pregnancy. This tendency was more marked toward the end of the period of gestation; 50 per cent of the women examined in the last 5 months of pregnancy showed serum calcium below the lowest values observed in normal nonpregnant women (9.0 mg. per 100 c.c.), while the same degree of diminution was found in only 22 per cent of those examined in the first half of pregnancy. No values below the normal range were noted in the first 8 weeks of gestation.

2. The average values for serum calcium in normal pregnant women were distinctly lower than the average for normal nonpregnant women (9.7 mg. per cent). They indicate a progressive diminution of serum calcium during the first half of pregnancy and a relative constancy of these values (8.8 - 9.0 mg. per cent) during the latter half of this period and at the time of labor.

3. The decreased concentration of calcium in the serum during pregnancy is probably not related to any calcium deficiency in that period but may be most logically accounted for at present upon the basis of the coincident occurrence of a dilution of the plasma (hydroplasma), for which there is considerable evidence.

4. The values for serum calcium obtained in cases of the toxemias of pregnancy are quite comparable to those found in normal women

at the same period of gestation. There is no evidence that low serum calcium bears a casual relation to the convulsive manifestations of eclampsia.

5. The serum magnesium in normal nonpregnant women was remarkably constant, 11 out of 16 determinations falling between 2.0 and 2.4 mg. per 100 c.c. (average 2.3 mg. per cent).

6. The magnesium content of the serum showed a tendency to be lower toward the end of pregnancy, and especially at the time of labor, similar to that shown by the serum calcium and probably attributable to the same cause.

7. A few determinations of serum magnesium in cases of toxemia gave values within the upper limits of the normal range.

8. Both the calcium and magnesium content of the serum return to normal shortly after delivery, although determinations made in the first two days postpartum gave values as low, if not lower, than those observed at labor.

9. The serum of lactating women showed no significant variations in calcium and magnesium content from that of normal nonpregnant women.

BIBLIOGRAPHY

- (1) Michel, Ch.: *Compt. rend. de la Soc. de Biol.*, 1899, p. 422. (2) Camerer, W., Söldner, and Herzog: *Ztschr. f. Biol.*, 1902, xxv, 1. (3) Givens, M. H., and Macy, I. G.: *Jour. Biol. Chem.*, 1922, 1, xxxiv. (4) Hoffström, K. A.: *Skand. Arch. f. Physiol.*, 1910, xxiii, 326. (5) Drennan, J. G.: *Am. Jour. Obst.*, 1911, lxiii, 653. (6) Oliver, J.: *The Practitioner*, 1915, xciv, 416. (7) Halford, A. C. F.: *Australasian Med. Gaz.*, 1909, xxviii, 595. (8) Oettingen, K.: *Zentralbl. f. Gynäk.*, 1921, xlv, 1510. (9) Low, O.: *Deutsch. med. Wchnschr.*, 1919, xlv, 826. (10) Zangemeister, W.: *Ztschr. f. Geburtsh. u. Gynäk.*, 1919, lxxxi, 491. (11) Fischer, Martin H.: *Edema and Nephritis*, New York, 1910, J. Wiley and Sons, 8 vo., 209 p. (12) Burekhardt-Socin, O.: *Arch. f. Gynäk.*, 1918, cix, 117. (13) Lamers, A. J. M.: *Ztschr. f. Geburtsh. u. Gynäk.*, 1912, lxxi, 393. (14) Kähler, E.: *Zentralbl. f. Gynäk.*, 1913, xxxvii, 884. (15) Linzenmeier, G.: *Zentralbl. f. Gynäk.*, 1913, xxxvii, 958. (16) Aymerich, G.: *Ginecologia*, 1913, x, 649. (17) Jansen, W. H.: *Deutsch. Arch. f. klin. Med.*, 1918, cxxv, 168. (18) Meigs, E. B., Blatherwick, N. R., and Cary, C. A.: *Jour. Biol. Chem.*, 1919, xxxvii, 1. (19) Morley, W. H.: *Surg., Gyn. and Obst.*, 1913, xvii, 504. (20) Kähler, E.: *Arch. f. Gynäk.*, 1920, cxii, 487. (21) Mazzocco, P., and Moron, E. B.: *Revista de la Asoc. Méd. Argentina*, Aug., 1921, xxiv, Abst. in *Jour. Am. Med. Assn.*, 1921, lxxvii, 1929. (22) Hess, A., and Matzner, M.: *Proc. Soc. Exp. Biol. and Med.*, New York, 1922-3, xx, 75. (23) DeWesselow, O. L. F.: *Lancet*, London, 1922, ii, 227. (24) Kramer, B., and Tisdall, F. F.: *Jour. Biol. Chem.*, 1921, xlvii, 475. (25) Krebs, B. S., and Briggs, A. P.: *Am. Jour. Obst. and Gynec.*, 1923, v, 67. (26) Leicher, H.: *Deutsch. Arch. f. klin. Med.*, 1922, cxli, 85. (27) De Waard, D. J.: *Biochem., Ztschr. Berl.*, 1919, xcvi, 186. (28) Bogert, L. J., and Plass, E. D.: *Jour. Biol. Chem.*, 1923, lvi, 297. (29) Miller, J. R., Keith, N. M., and Rowntree, L. G.: *Jour. Am. Med. Assn.*, 1915, lxxv, 779. (30) Stander, H. J., and Tyler, M.: *Surg., Gyn. and Obst.*, 1920, xxxi, 276. (31) Zangemeister, W.: *Ztschr. f. Geburtsh. u. Gynäk.*, 1903, xlix, 92. (32) Mitchell, J. R.: *Med. Rec.*, New York, 1910, lxxviii, 906. (33) Rissmann, P.: *Zentralbl. f. Gynäk.*, 1913, xxxvii, 196. (34) Rissmann, P.: *Ztschr. f. Geburtsh. u. Gynäk.*, 1916, lxxviii, 447. (35) Halverson, J. O., and Bergeim, O.: *Jour. Biol. Chem.*, 1917, xxxii, 171. (36) Macallum, A. B.: *Am. Jour. Med. Sciences*, 1918, clvi, 1.

AN OUTLINE OF POSTPARTUM CARE*

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THE influence of custom and tradition is shown in obstetrics more than in any other branch of medicine. This is particularly true of the puerperium. Antiquated methods of treatment are still used in an empiric way by many practitioners and it is a fact that practically no two institutions, hardly two individuals, treat postpartum cases alike. In a large majority of cases delivered outside of hospitals these patients may be said not to be treated at all.

The prenatal period approaches a gradual and natural climax, viz., the birth of the baby. Following this event the patient is many times simply placed in charge of the nurse and in the absence of fever or other alarming manifestations, she is allowed to manage the case.

In these days when so much attention has been drawn to the prenatal period and its treatment, it suggested itself to me that it might be well to discuss a few points in the treatment of the postnatal patient. It seems rational to believe that if we are given a normal patient, a normal delivery, and a normal baby, that here at least is one condition in the realm of practical medicine the treatment of which could be more or less standardized. There must be one best outline of treatment for puerperal patients. With this idea in mind I propose to take up in a brief way a few points in the treatment of the normal puerperal patient and to discuss what I think constitutes rational and competent treatment during this period.

What is meant by the puerperal period? It may be stated that this period constitutes the time from the completion of labor until the organs of reproduction return to their normal state, and that this usually takes from six to ten weeks. This return to normal, or involution is most rapid during the first ten or twelve days and while we regard this as a physiologic process it may easily and rapidly become a seriously pathologic one.

The outline of our treatment of this period may be conveniently grouped as follows.

1. To enforce an adequate period of rest.
2. To preserve asepsis in the birth canal.
3. To correctly manage the function of lactation.

Rest.—It is agreed that if there is one person on earth who has earned a good rest it is the parturient woman. An initial period of rest is of very great importance and something which I always insist shall be instituted immediately after delivery. The room should be darkened, the baby and all persons except the nurse excluded and the patient made as comfortable as possible, flat on her back with the head kept

*Read at a meeting of the New Haven Medical Association, April 4, 1923.

low. If after a short time a natural restful period is not obtained, I have no hesitancy in using codeine or even morphine in order to secure it. After a long and exhausting labor the patient may oftentimes be too excited to relax into a restful state and an efficient sedative or hypnotic at this time is invaluable.

Diet.—Why should not the puerperal patient have a reasonable diet from the start? What is rational about placing the normal postpartum patient on liquids for one or two days and soft diet two or three more before giving them something real to eat? For the past few years in both ward and private patients it has been my custom to give a general diet from the first and I have never seen any untoward results. There is little danger of overeating or digestive disturbances if well cooked food is served to the patient in an appetizing manner. For instance, the diet during the first twenty-four hours may include eggs, toast, ice-cream, bread and butter, cooked cereal, simple salad, baked potato, stewed fruit, rice, and of course soups, water, milk, tea, coffee, cocoa, etc. On the following day a regular diet may be instituted. With sensible reservations the patient may eat anything that she wishes to. It may be furthermore stated that successful lactation is insured by a liberal diet from the first. Our dairy friends who know so much more about the subject of lactation than we do, and from whom we may learn much, agree that a full diet especially rich in protein has an extremely favorable influence in maintaining a rich milk supply. There is also something to be said about the psychologic effect of giving a patient real food when she is hungry. She is more apt to realize that she is convalescing in a normal manner if she is allowed to eat the food to which she is accustomed when up and around.

Bladder.—Diet and digestion naturally lead to the question of excretion. Let me say a few words here concerning the treatment of the urinary bladder in these cases. There is one lesson which we should learn which may be sloganized thus, "Never catheterize except as a last resort." The great danger of prolonged cystitis resulting from catheterization even under the most aseptic conditions must constantly be borne in mind. The patient should attempt early to urinate. If she is unable to do so there are various expedients which may be tried to influence this function. These include warm stupes over the pubes, the sound of running water, and sterile hot water poured over the vulva. Often times a large hot high enema will bring results when other things have failed. We need have no hesitancy about supporting the patient in the upright position by way of further attempt. An odd trick which some of my nurses sometimes successfully employ is that of placing the patient on a bedpan into which has been poured a small quantity of aqua ammonia. Mention should be made of the

hypodermic use of pituitrin .5 to 1 c.c. repeated once or twice at half hour intervals. In patients with marked abdominal relaxation a binder which fits snugly over the pubes often assists by giving the patient "something to push with."

How long may we allow these patients to wait before resorting to catheterization? It is perfectly safe to wait until the bladder forms a definite tumor over the symphysis and in any case 18 or 20 hours may elapse before catheterization is thought of. There is one psychologic point which I have observed in these patients that have to be catheterized, and that is occasionally they become profoundly depressed and unhappy because of their inability to urinate. I mention this so that when it occurs every form of encouragement and assurance may be given them by the physician and nurse.

Care of the Bowels.—The routine use of castor oil and other drastic purgatives following childbirth is as unnecessary as it is unpleasant. Since McPherson¹ made his report in 1917 I have avoided the old régime of purgation and have adopted the following plan. In normal cases 24 or 36 hours after labor if there has been no spontaneous movement a low soapsuds enema is given. This is repeated daily if necessary. If the bowels seem to act in a sluggish manner a mild vegetable cathartic or mineral oil is given at bedtime.

Let me summarize McPherson's interesting results with regard to this method of treating the bowels postpartum. His experiments were carried out in 1917 at the Lying-In Hospital in New York City and were briefly as follows: In 322 cases in which ordinary catharsis was used 28 had fever at some time during the puerperium. In the same number (322) of cases in which no catharsis was used only three had fever at some time during this period and one of these had a mammary abscess. Allow me to quote the author's conclusions, "When we consider the lessened danger of infection caused by the spreading about the mother's soft parts, of loose diarrhetic movements, when we consider the enormous amount of labor saved for the nurses as well as the comfort of the patient, and when we consider the figures quoted in this series, it gives us some intimation of the necessity for active thought on the part of the obstetrician for every move that he makes, every drug that he prescribes, and for less habit and more individualization. The writer is far from believing that there is never any necessity for administering a cathartic in the puerperium; quite the contrary; but what he wishes to emphasize is the danger and uselessness of routine drugging, and the assigning of certain effects to conditions which have not been shown to be the cause of the symptoms exhibited."

It has been shown furthermore by Kettner² that milk production is often greatly influenced by catharsis and he states that "a dose of castor oil or any other purge may turn the scale against the normal

development of lactation, especially if the child does not take hold well."

The Birth Canal.—As before noted, our efforts in this regard should be simply to preserve or maintain asepsis. It is essential that the discharges shall be absorbed and not allowed to accumulate. For this reason the vulval pads should be composed of aseptic absorbent material. These should be changed whenever soiled, the number in 24 hours varying according to the amount of discharge. For the first two or three days this should be at least every 3 or 4 hours and each time that there has been urination or bowel movements the genitals should be well washed from above downward. This is best accomplished by vulval irrigation followed by sterile cotton wipes. We may or may not use an antiseptic solution. An antiseptic solution is not necessary as has been shown by E. W. Plass³ in comparative observations made at the Johns Hopkins Hospital. Here equally good results were obtained, even in cases where there had been perineal laceration, by the use of boiled water. Douches are distinctly not indicated at any time during the normal puerperium. It has been repeatedly shown that infection has followed their use.

Care of the Breasts.—The beneficial influence of lactation on uterine contraction and involution must not be forgotten. After the first rest following delivery the breasts and nipples are thoroughly cleansed with soap and water and a simple ointment applied to the nipples on sterile gauze or oiled silk or paper. Either sterile vaseline or lanolin may be used for this purpose. Eight or ten hours after birth the baby should be put on the breast. This early initiation of nursing is very valuable for a number of reasons. The uterus by reflex stimulation expels clots more easily and any tendency to hemorrhage is checked. The milk production is augmented and the colostrum which acts as a natural cathartic prepares the baby's intestinal canal for milk digestion.

It does not seem out of place at this point to speak concerning some very interesting work which has been recently reported concerning the significance of colostrum in newborn calves. Theobald Smith and R. B. Little⁴ have demonstrated conclusively the importance of this fluid at least for newborn calves, and I think we may draw an important analogy from their work. Because of the difficulty in keeping alive calves which have not received colostrum, these investigators experimented with two groups of animals. In one group of ten calves which received colostrum, they report three deaths. In a group of twelve calves which did not receive colostrum they report nine deaths. Their conclusions were that the calf which is deprived of colostrum lacks something which permits intestinal bacteria to invade the body and multiply in the various organs, and they further conclude that the

function of colostrum is essentially protection against the miscellaneous bacteria which are harmless later on when the protective functions of the calf have begun to operate.

It is my custom to place the baby on each breast for five minutes every four hours until the secretion of milk begins to take place. At this time three hour intervals are assumed in the daytime and four hour intervals at night. Nothing further is done for the breasts except cleansing before and after each nursing with borie acid solution.

If the breasts are very pendulous a light binder may be applied, never so tight as to interfere with the free access of air. At the beginning of lactation the breasts very often become engorged and painful. As a rule this is largely due to venous congestion and not to milk retention. When this occurs fifteen or twenty minutes' steaming with a large hot compress of boiled water will relieve the pain and congestion almost immediately. Occasionally a single dose of codeine may be given in conjunction. I never use the breast pump for this purpose for this appliance unquestionably stimulates the breast to further activity a short time after it is used. If fissures are treated immediately on their appearance, breast infection will seldom occur. Various astringents such as glycerite of tannin, tincture of benzoin, or witch hazel may be used. If relief is not secured in a very short time the use of the nipple shield should be begun immediately. A glass shield is used similar to that at the Sloane Hospital, in combination with a three hole antieolic nipple. Of course this is boiled before each nursing. If the fissures persist and become deep it may be necessary for a light cauterization with the silver stick and the restriction of nursing on that side for one or more periods. Mention should also be made of the use of the lead nipple shield which I have sometimes used with success.

The Abdominal Binder.—"To bind or not to bind that is the question." The proper treatment of the relaxed abdominal wall following childbirth demands our attention not only to prevent a pendulous abdomen but also to secure comfort for the patient. While I do not advocate the routine use of the abdominal binder I do not think it can be entirely dispensed with. This is particularly true in multiparæ where there is sagging and relaxation of the abdominal wall. In these cases no amount of massage or abdominal exercise is going to have appreciable effect at least during that part of the puerperium which is spent in bed. These patients need abdominal wall support not only for comfort but to help them during defecation and micturition, to give them something to push with. The binder should be well fitted and not too tight. I do not believe all the dire results that have been attributed by numerous writers to the use of the abdominal binder, such as compression of the uterine and ovarian veins, retardation of

involution, constipation, subsequent prolapse. After the patient is up and about it seems to me time enough to begin the kind of abdominal exercises which will prove really beneficial in restoring muscular tone to the abdominal wall. At this time also I think that a properly fitting corset is essential, particularly in cases where a corset has been worn previous to delivery.

When Should the Patient Get out of Bed?—There have been more various opinions and more discussion about the length of time the patient should remain in bed following childbirth than any other question concerning the puerperium. Writers have advocated everything from keeping patients in bed three weeks to getting them out of bed 48 hours after delivery. I think very little analogy may be drawn from animals or primitive races in this regard. With regard to the former an entirely different mechanical problem presents itself. In human beings the floor of the pelvis in the erect posture is subjected to a downward pressure which does not obtain in animals in the quadrupedal position. In the latter, a careful study of the differences in musculature, carriage, habits, and athletic ability between these and their more civilized sisters will soon demonstrate why the latter should not go about immediately after delivery.

I think we should first consider posture in bed. Here one of our first problems is free drainage and if the patient is kept lying on her back the entire time free drainage is impossible. In order to insure this in normal cases on the fourth and occasionally on the third day I begin propping them up in bed. The general rule that I follow is as follows: The first few hours after labor the patient is kept flat on her back without pillows. After 24 hours she may turn on her side for a short time. After the third day she is encouraged to lie on one side and then the other and for a while each day on her abdomen. On the third or fourth day she is propped up for a short time one notch on the Gateh Bed. This is increased daily so that by the seventh day the patient is sitting up in bed practically ad libitum. If on the tenth day the fundus has reached the level of the symphysis she is allowed out of bed in a chair a few minutes. This is increased daily as the patient's strength permits and the thirteenth or fourteenth day a few steps are taken.

Three weeks at the hospital is not only not excessive but quite ideal and when patients insist on going home before this time careful instructions are given so that the hospital regime shall be continued at home. Patients are not allowed to climb stairs under three and one-half weeks and are allowed to ride in the open air after the fourth week.

As soon after this time as the patient is able to come to the office I make the final examination. At this time a thorough pelvic and gen-

eral examination is made and the case referred to the family physician if no further treatment is necessary.

In this somewhat discursive paper I have tried to emphasize the main points in the care of the normal puerperal patient. It is only the careful study of a definite postpartum regime that the physician will do his whole duty to his patient. If he will take the time to explain the reasons for exacting care at this time he will find that every intelligent patient will willingly cooperate.

REFERENCES

- (1) Bull. Lying-In Hosp., New York, May, 1917. (2) Med. Klinik, Oct. 29, 1916. (3) William's Obstetrics, pp. 365, New York, 1917. (4) Jour. Exp. Med., 1922, xxxvi, 181.

59 COLLEGE STREET.

THE FEEDING OF PLACENTAL EXTRACT TO MOTHERS; ITS EFFECT ON BREAST-FED INFANTS.*

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THE poor success which a large percentage of my recently delivered patients had in nursing their babies, induced me to look into the question of stimulation of the flow of breast milk. The placenta has received a great deal of experimental attention, since it develops concomitantly with the marked growth of the breasts. Whether or not the placenta is a secretory organ is a subject much discussed in the literature, but more recently the majority of investigators seem to agree that the placenta elaborates an internal secretion.

The placenta was first described as an internal secretory gland in 1884 by Johannes Miller, and since then a great deal of literature, both for and against, has accumulated on the subject.

Bandler, in the New York Medical Journal, November, 1920, says: "Although not making a plea for the use of placental extract, it must be considered as an internal secretion, the same as thyroid, ovary, and other glands; and as to its use being empirical, so is that of all the other glands." He theorizes at some length to show the balance of the various glands and their effect on menstruation and pregnancy; all of which may be summed up as follows: We are dealing with a secretion produced by the outer shell of the ovum, viz., syncytial cells and chorionic epithelium, which is the early placenta. From the beginning of pregnancy this placental tissue is thrown into the blood stream, producing a secretory action. The corpus luteum prevents menstruation, holding the decidua for the fertilized ovum. The corpus luteum must be stimulated to added growth during pregnancy to prevent menstua-

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tion and miscarriage; and the stimulus is supplied by the secretion from the early placenta, which changes the false to the true corpus luteum. The posterior pituitary gland is the antagonist of the corpus luteum; when stimulated by the growth of the corpus luteum, it causes the onset of menstruation. The placental secretion aided by the corpus luteum is antagonistic to the overaction of the posterior pituitary gland, and prevents the arousing of the posterior pituitary, thereby inhibiting menstruation and miscarriage. There is a balance of the endocrines in the menstrual cycle, the ovary and posterior pituitary being balanced by the thyroid and corpus luteum. During pregnancy these are held in check by the placenta. Thus Bandler tries to prove a secretory action of the placenta.

Fellner, Halban, and Cohn, obtained results showing that the placental extract plays a rôle as a stimulus to mammary growth in the virgin; while Biedl, Königstein, Basch, Frank, and Starling, in experiments seem to disprove this idea.

Hammett, in a series of pregnant women in the Boston Lying-In Hospital, could detect no difference in size of the breasts when feeding placental extract, and says: "From the evidence at hand it is reasonably certain that the placenta has little, if any, direct influence upon the mammary hyperplasia of pregnancy, the source of the stimulus lying in part in the fetus."

Mammary hyperplasia represents the preparation of the glands for the function of secreting milk; and the source of the stimulus initiating and maintaining lactation is the problem to be chiefly discussed here.

Studies of Goetz, Ribbert, and Hister, show that nerve stimulation is unimportant for milk secretion. Halban, in a series of experiments, eliminated ovaries, uterus, and fetus as the immediate cause, and concluded that the placenta, during pregnancy, gives off a substance acting as a check to milk secretion, and, therefore, removal of placenta at term allows the secretory function to be taken up. On the other hand, Nicklos claims to have obtained increased milk secretion with placental extract, and concludes that there is an overflow of placental secretion into the blood stream during labor. This causes milk secretion. This explanation, however, does not take into consideration the interval between labor and onset of lactation, nor the question of the continuation of milk secretion.

Van Hoosen and Cornell conclude that placental extract acts as a galactagogue, basing their conclusion on the increased weight of the infants.

In a series of cases published in the *Woman's Medical Journal*, Van Hoosen gives some very striking results, and calls attention to the fact that many animals eat their placenta. She also emphasizes an-

other difference between the human and animals; namely, that the young animal immediately attacks the breasts, thereby directly stimulating them. She states: "The first report of our results came in the form of a complaint from the nurses. They requested that the dose be cut down because the patients had so much milk that it was a burden to keep the breasts empty. The head nurse on the floor reported that on the morning this complaint was made, there had been removed from a patient 16 ounces of milk after the infant had taken all it would. Three other patients had each 6 ounces removed after nursing; a fifth had 8 ounces, and a sixth, 4 ounces. A total of nearly three pints of breast milk in one morning from six patients, without depriving the baby."

In this paper 25 cases are tabulated, all the patients having received scopolamin—morphine analgesia, and placental extract. The results were as follows: One-fourth of the infants gained during the first week, and one-half of the infants maintained or increased their birth weight at the end of the second week. Only two infants lost in weight, both first and second week. That this effect cannot be ascribed to the twilight analgesia, she proved by running parallel series of cases, both without placental administration, but giving one series scopolamin. She found that only one infant gained the first week, while four infants lost both first and second week.

In a series of 300 cases of McNiell, and McNiell and Hammett, the nursing women were fed 30 grains of desiccated placenta per day, without an increase in milk secretion. In another series by the same men, the chemical composition of the milk was tested after the feeding of the desiccated gland. They found a slight decrease in the percentage of fat, a slight increase in protein, and a rather marked increase in lactose.

Although, there was no actual increase in milk secretion, a series of cases reported by Cornell, showed that 87 per cent of the babies, whose mothers received desiccated placenta, began their gain on the fourth and fifth day of life, against 69 per cent of those not receiving the placental extract; 44 per cent of the former regained their birth weight before leaving the hospital against 24 per cent of the latter. He found the age of the patient played no part in the above series.

Hammett concluded that placenta does not act as a galactagogue, but as a stimulus to the infant's growth, and in a large series of cases showed that there was a smaller postnatal decline, a quicker recovery from initial loss, and an increase of 60 per cent of the rate of growth by the thirteenth day.

To ascertain the effect of the administration of placental extract on the maternal metabolism, the purin metabolism of a series of cases

was determined by Harding and Young. They found a very marked increase in purin metabolism, too marked to be ascribed to the purin contents of the ingested placenta. Whether or not placental tissue actually causes an increase in milk secretion, the changed milk composition and increased purin metabolism certainly speak for some hormone action.

I believe the most important and clear cut results of any investigator were obtained by O. Frankl. He showed that the placenta is an internal secretory organ and by its action inhibits the formation of milk. He grafted placental tissue into mice just before the birth of their young, and found that wherever there was a "take" of the graft, the young animals died of inanition due to a persistence of the colostrum stage.

The proper dosage with which maximum results could be obtained was also a matter of discussion. Cornell said that he obtained his best results with a dose of 5 grains of desiccated placenta three times a day. Van Hoosen began with 50 grains per day in divided doses. Her patients complained of headache, so the dosage was cut to 30 grains per day.

In the series of cases which I wish to report, a large number were given 60 to 80 grains of desiccated placenta per day by mouth without complaint. The average dose of desiccated placenta for most patients in this series was 10 grains three times a day. About 10 patients, not included in this series, received "Placental Hormone," an experimental product of Parke Davis & Company, but this was discontinued because the patients objected to the discomfort of the hypodermic injection. These cases are not included because there were too few to allow conclusions.

My series consists of 76 cases from the service of the St. Louis City Hospital. Any markedly abnormal cases, such as puerperal infections with high temperatures, or mothers with babies so premature and small that they could not nurse, were excluded from the experiment.

On account of one's inability to forecast the supply of milk, it was very difficult to interpret results. It seemed best to compare a fairly large group of cases with another group which did not receive placental tissue, but whose care and food otherwise were the same. This was done by checking against a group of normal cases of another obstetrical unit of the hospital which were delivered about the same time.

All cases were charted, one curve showing the weight of the baby, another its temperature, and a third the mother's temperature. The amount and kind of all medication or abnormality was noted on the chart.

Since the large babies as a rule nurse better than the smaller ones,

and as the better stimulation makes it likely that the mothers of these babies would have a greater supply of milk, the average weight of the babies in both groups was compiled to see that there was no marked weight advantage of one group over the other.

The average weight in those receiving medication was 3278 grams, and in the other group was 3339 grams, a difference of 61 grams.

The average initial loss of weight in group I was 243 grams, and in group II, without placental medication was 314 grams. Thus with the average weight of the babies in both groups practically the same, the average initial loss was greater in group II.

In checking the amount of gain over birthweight in group I, I was rather surprised to find that although more babies regained their birthweight by the tenth day, the amount of gain was less than in those of group II who did not receive placenta. The average gain over birthweight in the first group was 57 grams, while in the second group it was 142 grams. Although the amount of gain in the second group was greater, there was a marked difference in the number who regained their birthweight. By the tenth day 49.7 per cent of the first group had regained their weight, while only 30 per cent regained it in the second group.

It has been claimed by some that the mother's milk "comes in" sooner when placenta is fed before delivery. I was unable to substantiate this claim, as feeding for a week or 10 days before the birth of the baby did not cause milk to appear before the third day.

There is, however, some difference in the time at which the babies begin to gain weight. Taking the fourth and fifth days together, 86 per cent of cases of the first group gained weight, while only 68 per cent of cases of the second group gained. Sixty and three tenths per cent began to gain weight on the fourth day of life, when the mothers received placenta, while only 30 per cent gained on the fourth day, when no placenta was fed.

Although the results are not striking, there is enough difference to believe that the placental extract has had some action on the growth of the babies, even if not on the increase in breast milk. Certainly, there is a definite difference in the averages of the two groups of cases.

In order to check up the above series and to see if the results may not have been accidental, Dr. Storrs kindly consented to a similar investigation at the St. Louis Maternity Hospital. This series consisted of only 15 cases, but the general results were about the same as in those reported above, although the increase over birthweight was markedly less in all of these cases, as compared with both City Hospital groups.

In group I, (those to whom placental extract was fed), 33 per cent

gained on the fourth day, 66 per cent on the fifth day, and none later than the fifth day. Four cases, or 26 per cent, regained their birthweight by the tenth day.

Group II (no placental feeding), showed 26 per cent gain on the fourth day, 60 per cent on the fifth, and 13 per cent on the sixth day. Taking the fourth and fifth days in this series, 100 per cent gained in group I, and only 86 per cent in group II.

The average weight of the infants in the two groups of the St. Louis Maternity Hospital series was 3475 and 3438 grams, respectively.

The difference in the average initial loss of weight was very small, but still in favor of group I. It was 247 grams for group I, and 261 grams for group II.

The age of the City Hospital group of patients was between 16 and 30 years, and about the same number of primiparae as multiparae, some of the latter giving a history of no milk with their previous pregnancy, and a good supply this time, and vice versa.

To draw conclusions from a series of this kind, many things should be considered, and I believe among the most important is the psychology of the patient. Those at the City Hospital are of the stolid type and desire to nurse their babies, while most of those in the wards of the St. Louis Maternity Hospital, are highly neurotic, besides which, they are very choicy of their food and eat less.

The size of the breasts has some influence, but does not determine whether or not there will be a sufficient milk supply, as many of the small breasts secreted better than the larger. Some breasts were so small and flat that when filled to capacity they had only about an ounce of milk.

The two series of observations reported here closely resemble those of Cornell and Van Hoosen in many ways. I feel that although all these investigations show that placental medication does influence either milk secretion, or the immediate growth of the infant, neither a real galactagogue, nor the main stimulus of milk secretion has been discovered in dried placental tissue. The results have not been of a sufficiently clear cut character. I believe that if the placental secretion really stimulates the secretion of milk, the feeding of large amounts should produce the effects which could be seen grossly and without question in most cases, especially in those which already have a large amount of milk and large breasts.

If Frankl, Fellner, Halban, and Cohen, are correct in their theory, that the hyperplasia of the breast is induced by the placenta and that something else initiates and maintains the milk supply, might it not be well to feed flat-breasted prenatal patients with desiccated placenta? If Frankl's experimental results are true in the human, then the apparently somewhat favorable results in the above series demand some explanation. This probably can be done in the fol-

lowing manner: With the placenta antagonistic to the organ causing milk secretion, its removal allows this organ to functionate. Small amounts of placenta given at that time, not enough to definitely inhibit the function of this organ, might cause some added hyperemia in the glandular tissue, and thus cause the change in milk composition and a slight increase in milk secretion.

Up to the present time, however, by far the best stimulus to milk secretion has been found to be a large hungry baby and a cooperating mother.

METROPOLITAN BUILDING.

PAINLESS CHILDBIRTH BY SYNERGISTIC METHODS*

(A Preliminary Report)

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MYTHOLOGICAL, profane and sacred literature abound in incident, fact and fancy, showing that from the dawn of history man has sought to assuage grief and pain by some means of dulling consciousness.

Both the Bible and the Talmud contain references to the ancient practice of inducing sleep by artificial means. In these attempts many methods and diverse agents have been employed. The inhalation of fumes from various substances, weird incantations, the external and internal application of drugs and many strange concoctions, pressure upon important nerves and blood vessels, mesmerism, hypnotism, etc., have all played their part in the evolution of anesthesia. But modern anesthesia was not known to the world until after the successful public demonstration of ether by Morton in 1846.¹

One of the first uses to which it was put was to modify the pains of childbirth. Sir J. Y. Simpson² of Edinburgh, Scotland, was the first to use ether in obstetrical cases, but not entirely satisfied, sought a substitute and to him we are indebted for the second most universally used agent for general anesthesia—chloroform. Common sense prevailed over the opposition of clergy and laity of his day, "to avoid one part of the primeval curse on women," and chloroform and ether are now used almost universally for special cases and in certain stages of labor. However, where expense is not considered, nitrous oxide and oxygen have supplanted the use of these agents.

In 1880, Klikowitch³ of St. Petersburg recommended an 80 per cent mixture of oxygen with nitrous oxide for obstetrical purposes and this is about the admixture that is used today for analgesic purposes. Guedel of Indianapolis was one of the first to endorse strongly this combination in normal labor in the United States (1911), and it is now quite generally employed.

Spinal analgesia has been used with success—as have also local analgesics to the

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cervix, the perineum and the rectum, but these methods have but few followers today.

Schneiderlin, in 1899, recommended the use of morphin and scopolamin for surgical anesthesia, but Steinbüchel first recommended its use in labor in 1902. Krönig and Gauss of Freiburg are responsible for its introduction into the United States, reporting 3,000 cases in a paper read in Chicago in 1913. Krönig and Gauss use narcophin, a proprietary narcotin—morphin meconate. There is a good reason for using this combination and those who do not, have no right to condemn or criticize "twilight sleep". Sollman states, (P. 260) "Narcotin has a considerable potentiating action on morphin. The hypodermic injection 5 mg. of morphin produced no measurable analgesic effect with 10 mg. the analgesia was marked in two subjects; the third responded by hyperesthesia. With narcotin 8 mg. was ineffective, 30 to 40 mg. produced first some hyperexcitability then slight analgesia. With a mixture of equal parts of morphin and narcotin containing $3\frac{1}{2}$ mg. the analgesia was almost as great as with 10 mg. of morphin alone. This combination was also effective on the subject who resisted morphin." (P. 267) "Morphin probably tends to delay the progress of labor by its psychic sedative action, largely by preventing the reinforcement of labor pains by the contraction of the abdominal muscles."

This system has been in turn, praised and condemned; today it is practically abandoned except by Krönig and Gauss and a few specially equipped sanitarium.

Sollman further states, "the use of scopolamin-morphin anesthesia is justified (if at all) only in specially equipped institutions and not in private practice, or even in ordinary hospitals." It is applicable only in about 30 per cent of labor cases.

All of the above agents and methods require either a specialized technic, unusual equipment or trained personnel. Numerous inquiries from many sources indicate that none of these methods are satisfactory to the majority of physicians.

The development of painless labor by synergistic methods was undertaken from a purely scientific and altruistic viewpoint. It was decided that the method should be so simple that it could be used either in the home or hospital, and by any physician, in an entirely empirical manner. The ideal sought was a state of relaxation and analgesia with consciousness, but little if at all impaired, so that full cooperation might be had at all times. The methods by which this condition was to be obtained were outlined to the chief and attending obstetricians of the Lying-in Hospital, Asa B. Davis and George W. Kosmak, and were as follows:

- 1st. To start with a minimum dose at which time no definite results were expected and to gradually increase the dose until definite results were obtained.

- 2nd. To stop at any time in the development of the technic, if either mother or child appeared to be in danger.

- 3rd. To publish the results whether favorable or unfavorable.

With this understanding, work was commenced on the 10th of February, 1923. The first 4 cases showed practically 75 per cent failure. Today the first chapter of painless labor by synergistic methods is completed when we can secure over 75 per cent success. By "success" is meant the amelioration of pain to such an extent that patients

state that they were "helped,"—only a few of the 75 per cent had a comparatively painless labor. By "failure" is meant whenever the patient obtained no relief from the method. At no time was the mother's condition imperiled in the slightest degree. Only in one instance did the infant seem to be affected. Whether or not this was from the medication cannot be stated positively, but it seemingly was. In the first series of drugs used, there was not only failure but delay. This delay was in a measure corrected by placing 10 grains of quinine hydrochloride in the mixture. Sollmann states that "satisfactory results have been reported from its use in all stages of labor. This drug stimulates the contractions and increases the tone of the uterus."⁸ Since this addition, in only one or two cases has there been any delay, and in these exceptional cases, exhausted nature was more powerful than the drug.

There also seemed at one time to be an increase in the nausea and vomiting. This was corrected in a very great measure by eliminating urethan and paraldehyde, thus also making the final mixture simpler. The other drugs considered fundamental to the scheme are magnesium sulphate, urea, ether and morphin. Two to four drams of the magnesium salts is the maximum dose used in our investigations of painless labor, although the writer has used two ounces of the salts *per rectum* in other cases without deleterious effect. The magnesium sulphate must be chemically pure (the usual commercial product may cost 10 cents per pound—the chemically pure \$1.00 per pound).

Weston and Howard⁵ have injected 2 c.c. or more of a 50 per cent solution of magnesium sulphate subcutaneously or intramuscularly more than a thousand times with no local pain or sloughing. They state the sedative action occurs in fifteen to thirty minutes and lasts from five to seven hours, and is found to be a very good substitute for morphin and hyoscin. In a few instances the patient became quiet but did not sleep. In 82.7 per cent it was effective. In 6 per cent the dose was repeated before sedation occurred. In 11 per cent no effect was noted even after three or more doses.

Rector⁶ has used magnesium sulphate colonically in doses of two drams in over 300 cases. The Presbyterian Hospital used the salts over 200 times by hypodermoclysis in four dram doses with good results. In both instances other drugs or agents were added to complete the analgesia or anesthesia.

Magnesium sulphate used in two to four dram doses by rectum leaves a margin of safety amply sufficient to satisfy the most critical and is, next to urea, probably the safest drug in the combination. In the final series this drug is given hypodermatically.

In a personal communication, Alma J. Neill, Professor of Physiology, University of Oklahoma, states: "I have found that the rate of diffusion of the magnesium sulphate with urea was rather constant; that is, the range was between 30.9 and 32.1 per cent with the exception of a 6 per cent solution of the magnesium sulphate and a 1 per cent solution of the urea which diffused very much faster, it hav-

ing diffused 48.1 per cent in the same time. The whole range of percentages was used both with the magnesium sulphate and the urea. Each time the 6 per cent solution of the magnesium sulphate and the 1 per cent solution of the urea diffused practically 50 per cent faster than any other combination or any other substance which I tried."

Hewlatt⁷ has given 25 grams of urea every hour until 12 M. (100 grams in all) with no untoward results. Cushney⁸ states: "It is rapidly absorbed from the intestine and is practically devoid of action in the tissues even in the larger doses." The amount used, 1 per cent of a 4 ounce mixture, is therefore negligible as far as danger is concerned. It is used with the idea that it increases the absorbability of the magnesium sulphate. The exact relation between "diffusion" and "absorbability" is not definitely known, nor can we state at this time how much the efficiency of the method is due to the urea. Urea is not used in the last series.

"Ether⁹ is the anesthetic of choice if the patient is suffering from any form of toxemia or requires stimulation or is suffering from shock." The amount used in our mixture, two to four drams to a maximum of not over three ounces needs no extended comment. (Four to six ounces of ether is the amount used in colonic anesthesia.) Ten years after its introduction for general surgery, oil ether was first systematically used in 100 obstetrical cases by Thaler and Hübel.¹⁰

The mixture was 90 grams (3 ounces) of ether and 120 grams (4 ounces) of olive oil. The amount used at one injection was 100 c.c. (3½ ounces) introduced very slowly. In a typical case, a few minutes after injection, the eyelids close and a general relaxation sets in. The condition is suggestive of twilight sleep, but if there is no marked effect after ten minutes, a second injection of 50 c.c. (1¾ ounces) is given. In only one case was the method entirely impractical. With this one exception there was no complaint of pain or irritation of intestine.

In 16 cases this injection (50 c.c.) was repeated once.

" 25	"	"	"	"	"	"	"	twice.
" 20	"	"	"	"	"	"	"	three times.
" 15	"	"	"	"	"	"	"	four times.
" 12	"	"	"	"	"	"	"	five times
" 4	"	"	"	"	"	"	"	six times.
" 2	"	"	"	"	"	"	"	seven times.
" 1	"	"	"	"	"	"	"	eight times.

In one case the maximum total amounted to 767 c.c. of which 270 c.c. were lost. No rectal irritation.

In 88 cases the results were satisfactory.

In 4 cases there was absolute failure.

In 80 cases normal or very strong labor contractions.

In 20 cases labor was reduced or retarded. In these cases quinine or pituitary extract was added.

In some cases the labor seemed to be improved by the oil-ether mixture.

In 73 primiparas average duration of birth 20-¾ hours

In 27 multiparas average duration of birth 10-¼ hours

No anomalies of the afterbirth period were observed. No change in fetal heart beat. Usually born pink.

In 84 children condition normal—cried immediately.

In 14 children condition apnoeic—breathed normally in five minutes without resuscitation.

In 2 cases typical asphyxia—1 revived and second—forceps—was not resuscitated.

In the majority of cases during the intervals between labor contractions, the pa-

tients lay as if asleep, during labor contractions slightly restless and groaned occasionally.

The time of rectal instillation:

In 24 cases the os was dilated 2-4 fingers

In 27 cases the os was dilated 3 fingers

In 9 cases the os was dilated 4 fingers

In 3 cases the os was dilated more than 4 fingers.

No morphin or alkaloids were used. In no case was there excitement. Vomiting in five cases. Strong thirst in seven cases. After delivery a deep sleep. Upon awakening do not recall any incidents. Of 99 born alive, 1 child died on fifth day, after third day intestinal inflammation and subsequently pneumonia. Some babies were sleepy during the first one or two days. Ether by inhalation in comparison with this method affects the brain too much.

The disadvantage might be the impossibility of exact dosage on account of loss, but according to the writers, the difference of individual reactions makes exact dosage irrelevant. The method is impractical in private homes.

To revert to the synergistic method again the next drug to consider is alcohol. The ounce of alcohol was used principally as a vehicle for the ether; it also increases the absorbability of the mixture. Alcohol is below ether in analgesic qualities. Three-eighths of a grain of morphin *per rectum* (in our opinion) is the limit for this drug. The hyoscin is used to accentuate the value or to synergize the morphin. The alcohol was later reduced to two drams.

"The exaggeration of the effects of small doses of morphin which results from its combination with scopolamin are of great practical importance. This synergism may be experimentally demonstrated in various species of animals, especially in those species in which scopolamin alone, even when given in large amounts, produces no narcotic effects. The combined administration of small doses of morphin and small doses of scopolamin, which by themselves produce hardly any effects, results essentially in an exaggeration of the effects of morphin." (Burgi, Madelung.) Morphine and the hypnotics of the alcohol group when administered simultaneously also act synergistically, with a resulting exaggeration of each other's pharmacological actions. (Burgi, Fuhner.)"¹¹

THE METHOD

It is the exceptional patient who is so unfortunate as not to have received instructions, among other things, to keep the lower bowel clean, especially in the last stages of labor. The rule at the Lying-In Hospital is to examine and give a cleansing enema when admitted to the hospital. The patient is then sent to the floor where delivery takes place. The patient is therefore already prepared for the colonic administration of the drugs used, and this is the method adopted. A six ounce mixture seemed preferable, but was too frequently expelled, therefore a four ounce mixture is the final choice.

Time.—In selecting the time for the rectal instillation, we seemed to follow naturally the Freiburg method which is as follows: "After labor is well on its way, when the pains are four or five minutes apart and lasting thirty or more seconds, the first injection (hypo-

dermic) is made." It is at this time that the rectal instillation is given whether in a four ounce mixture or in divided dosage of two ounces. The effect is noticeable about the same time as a hypodermic would be and is not as painful. Analgesia is present in from thirty minutes to one hour after the administration, even in those cases in which a delayed action occurs. The time factor is subject to change.

Suitable Cases.—In the development of this method great care is being taken in rejecting cases that would in any way obscure the issue. For instance, if the uterus is dilating evenly and the contractions occur regularly, but with little pain, no medication is given; an even and sometimes painless delivery is then assured; or, when the cervix is fully dilated (four fingers or more) medication is withheld. Again, if the fetal heart sounds are irregular or bad, or malpositions occur, or if there is any question about the condition of the child, medication is withheld. After starting this method, a patient with indistinct fetal heart sounds was admitted to the hospital. Medication was withheld and the child delivered, but died within forty-eight hours. If the method had been tried in this case it would have properly come under suspicion. The cases selected were those not too far advanced and where there was a possibility of helping them. The selection or rejection of these cases necessarily fell upon the House Surgeons of the Lying-In Hospital to whom full credit is herewith given in exercising unusually good judgment.

Results.—The results have varied, but in the majority of cases, the patients have been "helped," the "pains were lessened" and, in a few, a comparatively painless delivery has occurred. Others were not helped in the slightest, while one or two stated that the pains were "intensified." This last statement can only be accounted for by taking into consideration the mentality of the patient who possibly expected very great help and received but little.

Formulae Used.—After using over fifteen different formulae the procedure was changed entirely as follows: The magnesium sulphate is now given by hypodermic and the rest of the medication by rectal instillation. Formula number 16 is 2 c.c. of a twenty-five per cent solution of magnesium sulphate (chemically pure) and morphin is added to the first hypodermic when indicated. Hypodermic is repeated once or twice but without the morphin. The rectal instillation used is:

Quin. H. Br.	Grains	10
Alcohol	Drams	4
Ether	Ounces	2½
Olive Oil	Ounces	1

Reliance is placed upon the synergism of ether and magnesium sulphate for the major effect.

Cowan states that, "in nearly all cases the cervix has dilated with

or without the addition of morphin but dilatation has progressed faster with the thick tough cervix when morphin has been given with the magnesium sulphate. In excitable patients and where you expect a long labor dissolve $\frac{1}{4}$ grain of morphin in the first hypodermic of magnesium sulphate. The ether, dissolved in one-third the amount of olive oil is given by rectum but not to the extent as used by Thaler and Hübel. The ether is not repeated as it is retained in over 98 per cent of the cases. The following is the usual procedure: Hypodermic magnesium sulphate (chemically pure) 2 c.c. of a 25 per cent solution (with or without morphin) is given when the cervix is dilated about two fingers, and repeated when necessary—one to three times. One to two hours later the instillation is given, when the pains are four or five minutes apart and lasting 30 or more seconds, and when the cervix is dilated two and one-half to three and one-half fingers.

This present technic is far superior to anything we have heretofore used, and with the last forty patients has been changed only in minor details.

Normal cases, not too far advanced, are selected as otherwise the issue would be obscured. The usual method is as follows: Place patient in Sims position and insert small catheter filled with olive oil (to exclude air) three or four inches in rectum. A small glass funnel is attached to free end of catheter and is held just above the hips; the mixture is now poured in slowly. Pressure is made during pains with a crumpled towel held in the hand pressed firmly against the perineum to prevent expulsion.

Cowan improvised a technic for parturient women, for which he cannot be given too much credit, and which is vastly superior to the funnel gravity method just described, inasmuch as it takes less time, is less likely to be expelled and by forcing the mixture into the upper portion of the rectum it is more quickly absorbed. It converts an uncertain procedure into a certainty and is as follows:

Cowan's Technic.—Connect catheter with large syringe holding the mixture, instil slowly, and with gentle pressure force the fluid between pains, the whole amount to be instilled between two and three pains. During pains pressure upon the perineum as heretofore.

This procedure should not take over five minutes, but pressure on the perineum should continue for fifteen minutes more. The advantages of this technic are obvious. The descending head tends to occlude the rectum and make instillation by gravity long and difficult, but with a syringe we can force a considerable part of the fluid beyond the head into the upper portion of the rectum. With this method the whole amount of fluid is retained in over 95 per cent of the cases. Relief of pain is noticed in from fifteen to forty-five minutes, the pain-free period lasting from four to five hours.

Results.—The effect of the synergists upon the nervous system is exciting in 3 per cent of the cases, unchanged in 3 per cent and sedative in 94 per cent.

It was thought this excitement was due to the alcohol, which is now reduced from four to two drams. There has not been a sufficient number of cases since to determine the effect of this reduction.

The deliveries are 4 per cent with forceps and 96 per cent normal.

Oceipito-posterior positions rotate in about the same proportion with as without the synergists.

Comparatively, postpartum hemorrhage is unchanged.

Labor is increased in time in 4 per cent, and progresses uneventfully in 96 per cent of the cases.

Nausea occurs in 2 per cent, thirst in 4 per cent, vomiting 8 per cent and normal and uneventful in 86 per cent of the cases.

Pain is increased in 1 per cent, unchanged in 3 per cent and modified or painless in 96 per cent of all cases.

Condition of Baby.—Asphyxia (not fatal) 1 per cent, apnoeic 2 per cent and crying 97 per cent.

CASE REPORTS

From service on Fifth Floor (O'Regan)

With the present technic pain is materially decreased in all cases, and in a few entirely eliminated; and labor is not, as a rule, delayed or prolonged, any more than it would be if the drugs were not used.

From service on the Sixth Floor (Cowan)

July 13, 1923. Mrs. R. W., Multipara. All previous labors normal. When admitted severe pain every two or three minutes and lasting for one minute. Cervix 2 fingers dilated, thick and soft. Ampoule of magnesium sulphate (2 c.c. 25 per cent solution) given at time of instillation. Distinct sedative effect lasting four and one-half hours. Patient stated she felt very little pain but was conscious that contractions were continuing. Second ampoule of magnesium sulphate given but no decided effect. Patient had fairly strong pains for two and one-half hours before delivery. Baby crying when delivered.

Conclusion.—Morphin should have been given with first ampoule of magnesium sulphate, but instillation should have been delayed until cervix was dilated to about three fingers.

July 31, 1923. Para 1, Mrs. I. V. Colored. Moderate sized woman who co-operated well when admitted, was having strong pains every two minutes, lasting fifteen seconds. Cervix three fingers dilated, soft, thin. Hypodermic 2 c.c. magnesium sulphate 25 per cent solution and at same time instillation was given, syringe method. Whole amount retained. Distinct sedative effect. Pains practically subsided, but patient felt contractions continuing. Patient dilated fully with the synergists. No nausea, or vomiting. Patient delivered one and one-half hours after instillation. As head was passing over perineum patient had considerable pain for five minutes. Excited. First degree laceration. No chloroform given except for repair. Baby crying when delivered.

Conclusion.—This patient should have had morphin with first hypodermic and also chloroform during last five minutes of delivery.

July 14, 1923. Mrs. L. S. Para 1. Medium size, pains every five minutes, fairly strong and lasting fifteen to thirty seconds. Cervix three and one-half

fingers dilated, soft but not obliterated. Hypodermic and instillation given at same time. Sedative effect lasted three hours and twenty-five minutes when hypodermic was repeated with good synergistic effect. Thirst and vomiting present. Cervix dilated from three and one-half fingers to full dilation. Delivery was spontaneous, four hours and thirty-seven minutes after instillation, and with only one hard pain while head was passing over perineum. No laceration. No chloroform used. Patient drowsy for one hour following delivery. Child crying and normal.

July 22, 1923. Mrs. C. C. Para 1. Moderate size woman, having pains every five minutes and lasting fifteen seconds. One ampoule of magnesium sulphate 2 c.c. 25 per cent solution with $\frac{1}{6}$ grain of morphin was given when cervix was dilated two to two and one-half fingers. Instillation given by syringe method when cervix was three fingers dilated, soft, but not obliterated. Whole amount retained. Two and a half hours afterwards hypodermic magnesium sulphate 25 per cent solution. Patient cooperated well. Sedative effect marked, as evidenced by sleep appearance and little pain, but patient stated she felt contractions continuing.

Some nausea and slight vomiting. Cervix dilated fully. L. O. P. position rotated to L. O. A. and was delivered spontaneously about four and a half hours after instillation. Patient had severe pains during last five or ten minutes. First degree laceration.

Conclusion.—A very good result but this patient should have had chloroform the last five or ten minutes while head was passing over perineum.

From service on the Sixth Floor (Cowan)

July 18, 1923, Mrs. V. H., primipara, large, heavy type of patient, having hard pains every minute, very noisy and complaining especially of backache which was almost unbearable. Cervix dilated two fingers. A hypodermic of morphin sulph. gr. $\frac{1}{6}$, dissolved in 2 c.c. of a 25 per cent solution of magnesium sulphate, given. The second amponle of magnesium sulphate without morphin was given one hour later. (Some relief but patient still complains of pain.)

Rectal instillation given one and a half hours after first hypodermic, cervix thin and dilated 3 fingers. At first slight irritating effect, sedative effect beginning fifteen minutes after instillation. Backache ceased immediately, pains less severe, but patient was conscious that contractions were still going on. Cervix dilated fully in forty-five minutes and delivery in one hour and forty-five minutes after instillation. Baby crying and normal in every way. No anesthetic used while head was passing over perineum, and delivery was accomplished practically with no pain—no laceration. The analgesic effect was still present after delivery, as evidenced by pinching perineum with towel clip without causing pain. No postpartum hemorrhage.

Conclusion.—Such ideal results cannot be expected in all cases.

COMMENT

It is stated authoritatively "that no drug which can so far abolish sensation as to make labor painless can be given to this degree without affecting considerably the normal process of labor." We cannot entirely concur in this statement, although it seems to be the consensus of opinion of all obstetricians and of all authorities. (As yet magnesium sulphate alone has not been tested for confinement cases.) By using the minimum dose of a number of drugs synergistically, it is believed that the above objection has been overcome. It must be remembered that when the four ounce mixture is placed in the rectum, it is still practically outside of the body.⁸ When absorbed into the blood, it is only then a part of the circulatory system.

Chart used in evolving this method.

LYING-IN HOSPITAL ANALGESIC CHART

A.P. Number.....

Date.....

Formula Number.....

NAME OF PATIENT

Para.....

TIME		
ACTUAL	TOTAL	
		1. Hypodermic { with gr... } morphin Cervix { Dilated...Fingers Thick Soft Hard Obliteration without } effect { unchanged sedative exciting
		2. " effect { unchanged sedative exciting
		3. " repeated { without } morphin
		4. " " { with gr.. } morphin { without }
		5. Instillation: Retained.... Gravity... } method Irritated.... Syringe... Expelled.... " Cervix: Dilated...fingers Thick Soft Hard Obliteration
		6. Effect of enema and hypodermic: { unchanged sedative exciting
		7. (Contractions of uterus) { Not affected increased decreased
		Does labor progress?
		8. Sensation of pain { decreased increased not affected
		9. Delivery— { with forceps without forceps
		10. Do occipito-posterior positions rotate normally?
		11. Condition of baby: { crying apnoeic asphyxia
		12. Postpartum: hemorrhage contraction of uterus
		Remarks on any of above numbers on reverse side.

DIRECTIONS FOR GIVING HYPODERMIC AND COLONIC INSTILLATION.—The hypodermic should be given when the cervix is approximately two fingers dilated. If a 25% solution of magnesium sulphate is used, 1/6 or 1/4 grain of morphin may be given with the first hypodermic only; if a 50% solution, give no morphin. The hypodermic should not be repeated unless the sedative effect is wearing off or is insufficient. State object of hypodermic is to *relieve pain*. From now on the patient should be kept as quiet as possible. If in a ward the bed should be screened, if in a room lower shade and exclude light and close the door. Loud talking and noise of all kinds is avoided as far as possible. Just before giving instillation repeat object is to *relieve pain*. When cervix is about three fingers dilated accompanied by good contractions place patient on left side—Sims' position. Fill catheter with olive oil in order to exclude air and insert about four inches into rectum. Place whole amount of instillation in a syringe and give *slowly*, care being taken not to admit air between olive oil in catheter and mixture in syringe. Under gentle pressure pass the fluid between contractions giving the whole amount between two to four contractions—tell the patient to "squeeze up" in order to induce reverse peristalsis. State that if contents are retained there will be no pain and thus secure her cooperation. Make pressure on perineum with a towel during pains for 10 to 15 minutes, but withdraw tube gently in 5 or 10 minutes. From now on patient can be on back or in whatever position is most comfortable for her. Place cotton in ears and cover head with preferably some dark colored material or with a towel. Give only necessary attention to patient, talking in a low voice and making all manipulations as gently as possible. *Note time of hypodermic and instillation on special chart and fill out chart as labor progresses.*

"In 'twilight sleep,' fetal asphyxia occurs in 9.6 per cent of cases but fetal mortality is not above the average."⁹ In our series the percentage is less than 1 per cent and this case was not fatal. The usual objections against twilight sleep (a) prolonged labor for hours and days, use of forceps more often necessary, the percentage of ruptured perineums higher, failure of occipito-posterior positions to rotate normally (b) restless delirium and violence, disturbance of heart and lungs, postpartum hemorrhage and uncertain results, do not seem to obtain with the present method.

In our series only in one case in 64 did asphyxia occur which gives a percentage of 0.64. As a general proposition "synergistic analgesia" is a safer condition than either oil-ether analgesia or "Twilight Sleep." In Twilight Sleep too much dependence is placed upon morphin and its action is too greatly stressed—hence the high percentage of asphyxia. With the synergistic method, we attempt to secure relaxation with the magnesium sulphate as well as using it for its power of prolonging the effect of the morphin. Ether is a powerful stimulant and analgesic as well as anesthetic. The attempt is made here to use it only for its stimulating and analgesic properties and we believe we obtain this by using it in the minimum dosage as given.

SUMMARY

1. Labor is not delayed, for while the pain is relieved the contractions continue in over 98 per cent of the cases.
2. The condition of the baby is not affected by the medication.
3. Ether administered colonically to the mother is safer from the offspring's standpoint than is sufficient morphine to produce the same effect.

CONCLUSIONS

We feel that in this small series of a little over one hundred cases we have established the fundamental principles upon which painless labor may be safely worked out, i.e., by using the minimum dose of a number of drugs, compatible and synergizing, using each drug for a definite and specific purpose.

REFERENCES

- (1-2) *Anesthesia*—Gwathmey, pages 12 and 21. (3) *DeLee*: Principles and Practice of Obstetrics. (4) *Sollman*: A Manual of Pharmacology, p. 548. (5) *Amer. Jour. Med. Sciences*, clxv, (March) 1923, p. 431. (6) *Amer. Jour. Surgery*, Oct., 1922. (7) *Monographie Medicine*, Vol. 1, page 423. (8) *Cushney*: Pharmacology. (9) *Manual of Midwifery*: Jellett and Mandill. (10) *Zentralbl. f. Gyn.*, 1923, xlvii, 337-384. (11) *Meyer and Gottlieb*: Pharmacology, p. 42. (12) *Midwifery*: Berkley, Andrews-Fairbairn.

GERMICIDES FOR USE UPON THE SKIN

BY ELLICE McDONALD, M.D., PHILADELPHIA, PA.

IN July, 1915,¹ I reported the results of experimentation upon a new solution for disinfection of the hands and abdominal skin before operation of the following composition: Alcohol, 60 parts; acetone, 40 parts; and pyxol, 2 parts.

Since that time, the solution has been extensively used and many clinics have adopted it. This is particularly true of Schenectady where the paper was read and where apparently all the surgeons use it.

McMullen² states that "we have used the alcohol-acetone-pyxol solution in the hospital in 8125 cases during the past eight years (fourteen months of which were spent in the service) and have no infection which we felt was due to skin preparation. The number of cases which were treated before minor operation in the office is probably twice this number with most satisfactory results." Stanton³ says that "our records show 3568 operative cases prepared by the alcohol-acetone-pyxol solution. I consider wound healing in this series almost perfect. Of course, we have had a few infections, all investigated and all traceable to causes other than skin preparation." Whiting and Sloeum⁴ have modified this solution by substituting phenoco 2 per cent for pyxol 2 per cent. This is a minor modification as phenoco is a germicide of the same type as pyxol and its germicidal action is apparently dependent upon the same germicidal substances. However, there is no doubt that phenoco acts very well in the solution. Four years' use of the solution with Whiting and Sloeum's modification at the Misericordia Hospital, Philadelphia, shows that 3401 cases were operated upon after the skin was treated by this method. According to Geo. P. Muller,⁵ the results "were eminently satisfactory."

These results substantiate the merit of the solution. In considering the question of the effectiveness of the solution, it is to be remembered that v. Herff has reported a large series of cases operated upon after skin preparation with acetone and alcohol alone, with very good results. My solution, with the addition of a strong germicide, is much more effective than that of v. Herff.⁶ The burden of proof does not rest, however, upon me alone, but v. Herff's evidence is available, as well as the results in practice of the other surgeons.

If this solution had only the qualities of being a fat solvent and of containing a germicide which is not neutralized by the skin or organic matter, it would still be superior to the commonly used skin disinfectants, regardless of its high germicidal quality. These two qualities, of dissolving fat and of not being neutralized by organic matter, are absolutely necessary in a skin or body disinfectant. The coal tar germicides are the only ones not so neutralized and, of these,

it is advisable to use the one with the highest phenol (carbolic acid) coefficient.

I hold no particular brief for pyxol, except that it has a high coefficient and is not neutralized by organic matter. Cyllin with a coefficient of 14, is another preparation which might be well substituted, although I know of no one who has done so. It is to be remembered that these coal tar germicides are obtained in the preparation of other coal tar products and that they must be manufactured by being put into emulsions in various ways. For this reason, they must of necessity be made by commercial firms and, even if the essential ingredients which give them their germicidal properties be discovered, these will still require to be made available for us by being manufactured into emulsions. The germicidal substances in these coal tar germicides are insoluble in water. Their germicidal power and quality can be estimated and gauged by means of the Rideal-Walker or "Hygienic Laboratory" methods of taking the phenol (carbolic acid) coefficient and their germicidal strength can be known in terms of phenol as a unit. The germicidal value is the quality in which surgeons are interested, and this can be estimated by any properly trained bacteriologist. The law, in fact, demands that claims in regard to the germicidal value must be substantiated.

There seems, however, to be considerable misapprehension as to the relative value of germicides in surgery. Germicides are rated according to their phenol (carbolic acid) coefficient, taking phenol as the unit and testing each substance against it under standard conditions and with a standard culture, such as 24-hour *B. typhosus*, which has a very high resistance to germicides. This gives the ratio of germicidal value. However, it is found that some germicides, which are very efficient under test tube conditions, are much diminished in value by the presence of organic matter. This is particularly true of the heavy metals, like mercury, iodine, manganese, etc., which are active coagulants of albumin. For this reason, in all tests for surgical work, it is necessary that the germicides should be tested in the presence of organic matter in order to approach the conditions of practice as much as possible. In body disinfection, organic matter must always be present in excess.

Germicides may be roughly divided into chemical germicides and emulsion germicides. The chemical germicides act by combining in direct chemical combination with the protein of the bacteria and so destroying them. These chemical germicides, at the same time, combine with any other protein substance present, such as the body tissue, blood, pus, serum, soap, etc. For this reason, all chemical germicides, while destroying bacteria, at the same time destroy tissue. They are usually applied in strengths which will cause but little tissue reac-

tion, but the destruction of tissue is there whenever they are applied to the body. An example of this type of action is the destruction of tissue caused by silver nitrate, bichloride of mercury or iodine. The chemical germicides are always neutralized by organic tissue and to be effective must be present in excess, as in the Carrel-Dakin method, but, even so, their action is limited by the barrier of altered tissue which they themselves form in combination with the skin or other body surfaces. Some of the chemical germicides stain the skin and this is considered proof of their action. As a matter of fact, the staining of the skin shows that they enter into chemical combination with the organic matter of the skin and is a proof of the limitation of their action. If this limited action is all that is required, there is nothing more to be said; but, if continued germicidal action is needed, it can be best obtained by germicides which are not neutralized by organic body tissues.

The emulsion germicides, on the contrary, are substances which are insoluble in water and are suspended in emulsion by various means, such as soap, gelatin, etc. The action of these upon bacteria is not fully understood, although the results of such action can be readily tested and gauged by taking their phenol coefficient. It may be that they take on some of the qualities of colloid substances. Why a substance, which is insoluble in water and does not combine with protein, does kill bacteria, is difficult of explanation, but tests of the phenol coefficients of these coal tar emulsions show that they are often very strong germicides, and, as a rule, are not neutralized by organic matter. In fact, when a substance can be put into both solution and emulsion, it is usually much more efficient germicidally in the emulsion. The germicidal action of these emulsion germicides is not the result of chemical union (as is the case of the heavy metals, formalin, etc.) but is associated with the emulsification of the colloidal suspension, as evidenced by the precipitation of proteins when a certain phenol concentration is reached. This action seems to be similar to heat coagulation. It is for this reason that the higher strengths of phenol disinfectants are proportionately stronger than the weaker strengths, as, for example, phenol (carbolic acid) below 1-200 becomes disproportionally weaker germicidally.

Most of these coal tar germicides are described as higher phenols or phenol homologues for want of a better name, but this does not mean that they have any of the character or poisonous qualities of carbonic acid. It is probable that there are a number of substances in them which have high germicidal qualities, as can be proved by the phenol coefficient. The one which has the highest germicidal value is thought to be para-hydroxi-diphenyl. This substance has been isolated in crystalline form and is insoluble in water. An emulsion of it has been

prepared experimentally and has a coefficient of 40 and is apparently but slightly toxic. At present, it is only produced experimentally, but it will make an ideal surgical germicide and would be an improvement in the solution here described.

The chemical germicides are all neutralized by organic matter. Bichloride of mercury, for example, is the best germicide under test tube conditions and without organic matter, as it has a coefficient of over 200*: but this coefficient falls to 20 with the presence of 1 per cent of organic matter, and, with further additions, the salt is neutralized and the germicidal action gone. Without organic matter, this salt will kill anthrax spores in $2\frac{1}{2}$ minutes in the proportion of 1-3000, being one of the few germicides which will do this; but, with organic matter, it will not kill anthrax spores, even in a dilution of 1-40. This shows the uncertainty of the heavy metal germicides.

Pure iodine, without organic matter, has a coefficient of 38, but, with 1 per cent organic matter, this is reduced to 7, and, with further additions, the metal is neutralized and the germicidal action gone. It is obvious that iodine on the skin forms a chemical combination with the outer layer of the skin and that then the iodine is neutralized. The outer layer is rubbed off or washed off during the operation and the unstained skin is left. It is probable that weak solutions of iodine, such as 2 per cent, are as efficient germicidally upon the skin as stronger ones, as there is no more than a superficial disinfection in any case. This is well shown by Robb who removed the excess iodine from the skin by potassium iodide in order to remove its inhibiting action in cultures and was able to recover bacteria from the skin surface in from 50 to 95 per cent.

If iodine is used upon the skin, it should be combined with a fat solvent in order to penetrate the glands and dissolve the fat. Before my present solution was devised, I published,⁸ in 1911, the description of a carbon tetrachloride-iodine-two-per cent solution which can be rubbed in the skin and contains a good fat solvent. The mechanical assistance given a germicidal solution by being able to rub it into the skin must be considerable help in getting disinfection. Acoholic solutions of iodine do not penetrate the fat of the skin and how can disinfection take place when the fat of the sweat glands and hair follicles is not penetrated? Alcohol is not a solvent of fat as found in the skin, i. e., the glyceride. The sole glyceride that alcohol will dissolve is castor oil and this action of alcohol is so unique that this is a test for castor oil; but, upon the skin glycerides, alcohol has no action.

One very interesting action of iodine upon the skin is the delay of healing which follows its use. Stanton⁷ has emphasized this chemical

*The coefficients here described are by the R. W. Method.

delay of healing and estimates that it often amounts to several days and is dependent upon the strength and application of the iodine solution. The delay seems to occur because there is tissue destruction which must be overcome and eliminated before true healing can begin. This is one argument for weaker iodine solutions as the irritating and blistering action of the stronger solutions is well known. Iodine was used as a counterirritant long before its use as a skin disinfectant.

Iodine does not seem to have any advantage over bichloride of mercury as a skin disinfectant. Both are irritating and both are neutralized by organic matter. Bichloride of mercury is a much stronger germicide, and it is apparently not any more irritating than iodine. However, the staining of the skin by iodine seems to make a deep impression and gives psychological comfort to the surgeon. Germicides which stain seem to be very appealing, as is shown by the recent vogue of picric acid which has a coefficient of only 2.5.

Hypochlorite of soda has a coefficient of 0.6 without organic matter, but, with organic matter, this coefficient is reduced to 0.075, both of these coefficients so weak as to be negligible. It is obvious, therefore, that the effect of Dakin's 1-200 solution must depend upon antiseptic action which is a very much different quality from germicidal action.

Potassium permanganate has a coefficient of 50 without organic matter, but, with organic matter (gelatin 1 per cent, serum 1 per cent) this is reduced to 7, and, with more organic matter, the salt is neutralized as a germicide, as is sodium hypochlorite. It would seem, however, that potassium permanganate has been neglected as a disinfectant for continuous wound irrigation as 1-10,000 permanganate would be theoretically equal to Dakin's solution in germicidal value. This is a rough comparison and true within limits. The ease of making the permanganate solution would be a great advantage and might overcome its staining properties. Permanganate is certainly worthy of more use in open wounds and in continuous irrigation where it is used in excess and frequently renewed.

Formaline has a coefficient of 0.3 and combines with organic matter. The germicidal value of this substance is so weak that it has no place in surgical work for any disinfectant purpose.

Picric acid in alcoholic solution has recently come into vogue as a skin disinfectant. This substance has a coefficient of 2.5 without organic matter. The 2 per cent alcoholic solution would thus be one-tenth as germicidal as my solution, or, in other words, my solution is ten times as germicidal. Picric acid, in addition, is neutralized by organic matter.

Alcohol as a germicide is so weak as to be not worth considering. This has been proved so often by so many observers that recapitula-

tion would be wearisome. I would refer any interested to Harrington's article. An evidence of the weak action of alcohol is that wines, such as sherry, must be fortified to 18 per cent alcohol so that they do not decompose. The belief in alcohol is largely traditional and is a relief of the conviction that alcohol was good for any ailment. It has, however, a useful solvent power upon substances other than fat. Its dehydrating action makes it of use when combined with acetone.

Quinine is a much neglected germicide; the bisulphate has a coefficient of 3. The antiseptic action of quinine is very high. According to my experiments, it inhibited growth of fresh typhoid culture in the strength of 1-30,000. Upon the same culture, bichloride of mercury inhibited growth in the proportion of 1-50,000 and pyxol in 1-20,000. This antiseptic action of quinine may be made use of in wet dressings of raw wounds or infected surfaces in the proportion of 1-1000 with boric acid. Either the bisulphate or the bichloride may be used. Quinine bisulphate is also useful for bladder cystoscopic work or bladder irrigations in the proportion of 1-1000 as described in a former paper.

Some other coefficients of interest to surgeons are: creolin 2.5, benzoic acid 4, salicylic acid 6, eucalyptus 1.2, lysol 2.5, guaiacol 1, thymol 20, cyllin 14, izal 10, phenoco 15, pyxol 20, etc.

Antiseptic action is apparently dependent upon different qualities from germicidal action. Inhibition of growth is sometimes produced by substances which have weak germicidal qualities, such as quinine. It may be that such antiseptics have a special action upon micro-organisms by preventing their reproduction or else upon the early budding stage. Organisms have varying powers of resistance, so that some are more easily killed. *B. typhosus* for example, being very resistant. Resistance is, in my opinion, constant for any germicide that has sufficient action to be measured by the phenol coefficient. This is the only accurate method of judgment for any germicide for surgical purposes and, if the germicide is not of sufficient strength to be measured, it is of no use in surgery.

It is questionable whether the destruction of spores upon the skin surface is ever possible. Bichloride of mercury, the strongest germicide known, will not kill anthrax spores in the presence of organic matter in 1-40 solution. Spore-bearing bacilli which cause disease are anthrax, tetanus and gas gangrene. In my opinion, no chemical preparation will kill these spores in the presence of organic matter within the limits of time required for surgical preparation. Dependence must be upon the mechanical solvents of the solution and this is one of the advantages of being able to rub a solution into the skin. Spore-bearing bacilli are fortunately very rare upon the skin. Maher, in fact, denies that they are ever found, except in obviously diseased

skin. But, in any case, it is better to depend for their destruction upon a solution which is not neutralized by organic matter and which acts over the period of several minutes that it is applied, than upon a solution which is immediately neutralized by the skin itself.

It must not be thought that it is claimed that my solution is stronger than iodine under test tube conditions and without the presence of organic matter. Under these conditions, the commonly used iodine solution is probably about three times as strong as my solution, but disinfection of the skin is an entirely different problem from disinfection without organic matter. On the skin, iodine is promptly neutralized, while the coal tar germicide acts during the time it is applied and this prolonged action, due to the fact that it is not neutralized, makes its weaker germicidal power more effective. Iodine in the proportion of 1-10,000 will kill staphylococcus very promptly without organic matter, but, in the presence of serum, iodine in 1-800 dilution will not kill staphylococcus within half an hour.

Epidemics of infection in clinics are seldom due to faulty skin preparation. It is the isolated case which is due to skin infection. If one clean case after another becomes infected, it is reasonable to suppose that the infection has been introduced from without from some infective focus, elsewhere than in the patient's skin. It would be improbable that each clean case harbored the same germs of infection; it is more probable that in epidemics, there is a common source of infection, outside the patients' skin. For this reason, in epidemics of infection, a source or focus outside the skin should be searched for. Sore throat among the operating room attendants is a common cause and Stanton⁹ and McMullen have reported a series of infections from this cause. The operating room staff should be instructed to report any sore throat or other infective focus which they may harbor, so that they can be eliminated from the operation.

No doubt, many surgeons will continue to use iodine for the skin and, if they do so, a fat solvent should be combined with the iodine as in my carbon tetrachloride-iodine-two-per-cent solution.⁸ The same effect is by no means obtained by preceding the alcoholic iodine by a fat solvent. The fat solvent should carry in the iodine.

However, for hand disinfection, iodine is not used on account of its irritating qualities. Here, the coal tar solutions have no rivals as they are not irritating to the hands and they are not neutralized by the preceding soap. Washing the hands with soap and water alone has no disinfectant value. This has been repeatedly proved. However, surgeons are not likely to give up washing their hands before operation, so that it might as well be made of some use by combining, with the wash water, a germicide which is not neutralized by soap, so that the water may have some germicidal value and the hand wash-

ing be to some purpose. This germicide can only be one of the coal tar germicides and the fact that they are emulsions, aids their effectiveness in wash water with soap.

The following directions in the use of my method are given as it is very commonly misunderstood.

DIRECTIONS FOR DISINFECTION OF THE HANDS (MC DONALD METHOD)

As washing the hands with soap and water has no effect upon the bacteria of the skin, even if kept up for 15 minutes, it is advisable that some germicide should be added to the wash water. This germicide should be one which is not neutralized by soap or organic matter as contained in the skin, such as pyxol 1-1000 (or phenoco, if preferred) in the basin of warm wash water. This strength will kill *B. typhosus* in $2\frac{1}{2}$ minutes and the pus forming organisms are more easily killed than *B. typhosus*.

The area under the nails is the most difficult place to disinfect and, therefore, particular attention should be given to the introduction of the germicidal solution under the nails. Nail brushes should be used for the nails only and wash cloths for the hands and arms.

1. Wash the hands in soap and water, containing pyxol 1-1000 (or phenoco 1-1000), in a basin for three minutes. Scrub the nails with a nail brush and the hands and arms with a cloth. This solution may be used repeatedly. This thorough scrubbing is done only at the first operation and, after this, the time may be reduced to two minutes.

2. Keep wooden orange sticks and nail files in McDonald's solution and do the toilette of the nails, making an effort to introduce the solution under the nails by means of the wet nail file and orange stick.

3. Hands should then be washed in McDonald's solution for three minutes scrubbing the nails with the nail brush and using a cloth for the hands and arms. The solution should be at least three inches deep in the basin. The hands are then dried and prepared for gloves.

Preparation of Patients.—Shaving the night before operation should be done with water containing pyxol 1-1000 (or if preferred phenoco). In this way, the shaving water will be a germicidal solution and will aid disinfection, and, as the skin is again disinfected the next day, fractional sterilization will be practiced. At operation, the dry towel is removed and the area of operation rubbed lightly with a small towel or piece of gauze saturated with McDonald's solution, for three minutes. At the end of this time, the wet towel is placed over the operation area and allowed to remain there until the operator is ready when it is removed and the skin lightly dried.

In preparing for vaginal operation, the patient should have a douche of pyxol 1-2000 (or phenoco) the night before operation and the vagina washed at the time of operation with soap and water contain-

ing pyxol 1-2000. In this way, the water will have some germicidal value which it does not have with plain soap and water.

REFERENCES

- (1) *McDonald, Ellice*: Surg., Gynec., and Obstet., July, 1915. (2) *McMullen, C. G.*: Personal communication. (3) *Stenton, E. M.*: Personal Communication. (4) *Annals of Surgery*, May, 1916. (5) *Muller, Geo. P.*: Personal Communication. (6) *Deutsch. Med. Wehnschr.*, March 11, 1919, and *Oeri* (from v. Herff's clinic) *Ztschr. f. Geburtsh.*, n. Gynäk., 1909, lxii, 3. (7) *Surg., Gynec. and Obst.*, 1915, and *Albany Med. Annals*, 1916. (8) *Med. Rec.*, April 11, 1911. (9) *McMullen, C. G.*: Surg., Gynec. and Obst., July, 1915.

8305 SEMINOLE AVENUE.

DYSTOCIA IN AN ECLAMPTIC DUE TO A CASE OF CYSTIC HYGROMA OF THE PECTORAL REGION OF THE FETUS

BY FRANK T. HAMS, M.D., HOUSTON, TEXAS

I DESIRE to place on record the following case of a cystic hygroma of the pectoral region, in a fetus, large enough to cause dystocia, which is rare, and I hope of sufficient interest to justify its presentation.

Patient a primipara, colored, housewife, 19 years old. Mother, father, and three brothers and sisters, all living and well. No defectives.

Has been married one year. Husband living, has a two plus blood Wassermann and irregular attacks of asthma.

Patient healthy all her life, except for usual childhood diseases, and a leucorrhoea for the past year. Menstruation regular, 30 day type, five days, moderate flow, no pain, last period February 6, 1922, due about November 13, 1922.

History of present illness: Nocturia, 4 or 5 times and edema of the feet and legs for past three months. Constipation, dizziness, and frequent blind spells for past week.

On November 11th, 1922, patient was admitted to the Houston Municipal Hospital, in a semicomatose condition, after having been in labor for 18 hours, attended by a negro doctor. She was seen immediately by the interne, who reported that she was having severe pains every minute, that the cervix was soft, thin and four fingers' dilated, membranes ruptured, blood pressure 210 over 130, which rose to 225 systolic during a pain, and that the fetal heart was 160 and irregular. Urine showed a heavy cloud of albumin.

The interne was advised to take the patient to the delivery room and completely dilate the cervix under ether anesthesia, apply forceps and deliver as quickly as possible. Upon my arrival some thirty minutes later the head was on the perineum. The interne said that the forceps had slipped twice, they were reapplied, proper pull instituted and the head was born in the occiput posterior position, but no further progress could be made.

The pelvic measurements were normal. The uterus was firmly contracted upon the fetus and no fetal heart sounds could be heard. Maternal pulse was almost imperceptible and the patient was semicomatose.

A small fetal head and a uterus well filled up made one think of twins complicated by contraction ring, or of a monster. Vaginal examination revealed an

unusual cystic condition on the back of the fetus, which gave the sensation of a hematoma. After a consultation, embryotomy was decided upon. The sac referred to was punctured and about one pint of fluid was removed, but still the uterus held the fetus. After decapitation, the removal of an arm, and the removal of the left lung, it was decided to risk an anesthetic. When the uterus relaxed a cystic condition was found anteriorly, which was punctured and about one quart or more of clear straw colored fluid was withdrawn and finally the fetus was extracted.

A second degree laceration was not repaired and the puerperium was stormy, being complicated by low grade peritonitis, pyelitis and phlegmasia alba dolens. Patient left the hospital January 7th in good condition.



Fig. 1.

Inspection showed a female child at term, apparently fully developed, with a large tumor mass on the left side of the thorax, extending laterally, from flexor surface of wrist to costal margin; anteriorly, from sternum and lower surface of clavicle to vertebrae and upper part of scapula posteriorly. The arm was nearly encircled by the tumor mass, except for a narrow strip on its posterior aspect. The surface of the tumor anteriorly was irregular and appeared somewhat nodular, elsewhere the skin surface was smooth. The left nipple was displaced 7.6 cm. from sternum and 7.6 cm. lower than right nipple. The areola was about five times larger than the right areola and had several small locules in it.

Approximate measurements were as follows:—length, 48 cm., abdominal circumference, 27.5 cm., greatest circumference of tumor around thorax 58 cm., greatest circumference of tumor taken vertically 40.5 cm., cord-length 60 cm., Placenta 19x16.5x3.5 cm.

Autopsy shewed all internal organs normal. Incisions in tumor mass disclosed a multilocular cyst, containing clear, straw colored fluid, with 20 or more locules, varying in size from a pea to a hen's egg, each as a rule communicating with one or more locules, with some locules entirely separate. The tumor anteriorly was old, while that posteriorly was comparatively new, which carries out the idea that these so-called neoplastic conditions (and it is doubtful whether they should be placed among true tumors) spread along the lines of least resistance as more and more of the fluid accumulates. In this case the fluid had accumulated between the skin and subcutaneous tissue in front and the pectoral muscles behind on the left side. There was an extension of the cavity upward under the lower margin of the pectoralis major for a distance of little more than a centimeter. In tracing the cavity outward and downward along the left arm the coracobrachialis and biceps muscles came into view. On the posterior aspect of the left shoulder we were able to trace an extension of the cavity under the trapezius muscle, and in this region the deltoid and a part of the posterior scapular group of muscles came into view as forming a part of the anterior wall of the cyst. Microscopic sections of the walls of the cyst reveal varying thicknesses and to be made up of fibrous tissue, while the inner walls were found to be lined in places with an endothelial layer.

Comparatively speaking, cystic hygroma is a rare condition. In the *Annals of Surgery* for July, 1913, according to Dr. Chas. N. Dowd of New York, only 91 cases of cystic hygroma of the neck had been reported in the literature previous to his article, 35 cases of cystic hygroma of the axilla and 11 cases in other portions of the body. Dowd reports four cases. Since his article appeared other cases have been reported by Matthews, Downes, Lyle, Winslow and others; Winslow reporting a case of the pectoral region in a child 4½ years old.

Even though the condition is congenital it may not be noticed at birth. Occasionally at birth it is thought of as a hematoma and later as a nonpainful, harmless mass. It is a condition that usually manifests itself in infancy, less frequently in childhood, and rarely in adult life. Sometimes its presence is noticed as a harmless mass throughout life. One of the chief characteristics is its rapid growth along the line of least resistance and it often envelops important vessels and nerves, making operative treatment hazardous.

TUBERCULOUS OVARIAN CYSTS WITH A REPORT OF A THIRD CASE OBSERVED BY THE AUTHOR*

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TUBERCULOSIS of the female genital tract is a common disease and is found especially in the uterus and the tubes. The ovary, on the other hand, seems to be fairly immune as numerous examples and statistics show. Schlimpert found the ovary attacked in only 4.1 per cent of the cases of genital tuberculosis. v. Franqué reported an instance where the whole genital tract and the peritoncum were tuberculous but the ovaries were perfectly intact, despite the fact that the infection was of sixteen years' standing. Martin could find only 173 reports of tuberculosis of the ovary in 1899. However, some authors give much higher figures although usually based on rather small series. Cummins, for example, claims that 34 out of 40 cases (85 per cent) of genital tuberculosis examined by him showed involvement of the ovary. These figures are so high that I strongly suspect that they include not only ovarian tuberculosis but also tuberculous peri-oophoritis. The percentages given by other men vary very much and are as follows: Wolff 60 per cent; Terillon 50 per cent; Williams 44 per cent; Kelly 33.3 per cent (in children); Greenberg 33.1 per cent; Orthmann 33 per cent; Oppenheim 33 per cent; Labhardt 32 per cent; Neu 31.7 per cent; Berkeley 22.5 per cent; Ollivier 17 per cent; Rives 15 to 20 per cent; Kroemer 15.7 per cent; Horizontow (from the statistics of Bollinger, Schmorl, Schmaus, Ribbert and Albrecht) 15.4 per cent; Merletti 14.5 per cent, and Spaeth 12.6 per cent. A number of these authors also state that both ovaries are usually affected.

Judging from the records of the pathological laboratory of the New York Post-Graduate Medical School and Hospital, ovarian tuberculosis certainly is not common, as only seven such cases—mostly unilateral—have been seen there since 1913. In my own experience also, ovarian tuberculosis has been very rare. For a number of years I was in a locality where genital tuberculosis was very frequent, yet despite this fact, I did not see over a half dozen cases of ovarian tuberculosis and not a single bilateral infection. At the same time

*Read at the meeting of the N. Y. Path. Soc., on March 14, 1923.

it must be admitted that genital, peritoneal, or even pulmonary, or bone tuberculosis is at times associated with cystic formation in the ovary. These cysts themselves, however, are practically never tuberculous although a simple inflammatory reaction is often present. Nevertheless, some authors claim that the tuberculosis, by means of toxins, or otherwise, is still the direct cause of such cysts. These men consider the menstrual disturbances so frequent with tuberculosis as a further visible proof of their theory. Pollosson and Violet and Poncet and Leriche are especially fervid adherents of this tubercular etiology of many ovarian cysts. Poncet even goes so far as to assume that the inflammatory reaction of the ovaries in such cases is a genuine tuberculosis that has somehow lost its characteristic histological appearance. He calls this condition "Tuberculose Inflammatoire."

Although I have admitted just now that ovarian cysts are at times found in conjunction with local or even general tuberculosis, I must say that I can see absolutely no reason for accepting a casual relationship. Coincidence may play a large part in such findings, in fact it would be strange if two such common ailments as tuberculosis and ovarian cysts were not sometimes combined. Furthermore it is not very clear anyhow why tuberculosis should be more conducive to the production of ovarian cysts than any of the other inflammations. Personally, from my own experience and after a survey of the literature, I cannot believe that ovarian cysts are really so common with tuberculosis as Pollosson and Violet and Poncet and Leriche and their followers would have us think. Simmonds, for example, to mention only one name, found 80 cases of genital tuberculosis among 6000 female cadavers. Only 4 of these 80 cases showed ovarian cysts and Simmonds mentions expressly that the cysts were of long standing and certainly only accessory lesions. Not one of the 4 cysts showed a tuberculosis of its wall or contents. This absence of tuberculosis in ovarian cysts found associated with definite tuberculous lesions in the rest of the genital tract is another factor which speaks strongly against a tuberculous etiology for such growths, unless indeed one wants to accept Poncet's *tuberculose inflammatoire* as a genuine tuberculosis. This, however, does not seem warranted because it would then be difficult to explain why the tuberculous lesions in these organs should be totally different from such as are found anywhere else in the body. Furthermore, typical tuberculosis does at times occur in ovarian cysts so that it cannot be said that the ovarian tissue itself reacts differently from other tissues to the tuberculosis bacillus. Such cases of tuberculosis of ovarian cysts are, however, rare.

Schottlaender in 1892 could find only 7 cases of tuberculosis of ovarian cysts. Pruesmann in 1904 found 6 more. Celler later in the same year collected 20 cases including his own. A closer investiga-

tion caused Celler to eliminate 7 of the cases because they either were not examined properly or were not neoplasms. Among the seven was the case of Madlener which should not have been eliminated as it really was a tuberculous of an ovarian cyst, a fact which has since been brought out by Madlener himself. Up to 1904 then there were only 14 positive cases of tuberculous ovarian cysts reported in the literature. Since then a few more have been reported sporadically.

In 1915 I was able to report the first case of my own.

This was a nulliparous, single woman, 50 years of age (M.L.M. Chart No. 403, 1915, Frauenklinik, Tuebingen). She was generally asthenic, had lost much weight and complained of pains in the abdomen, also of cough.

The physical examination showed pulmonary tuberculosis and a left sided ovarian cyst as large as an adult head and a right sided cyst about the size of a goose egg. At operation, under spinal anesthesia, a general peritoneal tuberculosis with many adhesions, but no ascites, and the described cysts of the ovaries were found.

Because of the poor condition of the patient only the adnexa and a piece of peritoneum were removed. Pathological examination showed that the large cyst was of serous type, the smaller one a dermoid. Both the peritoneum and the wall of the large cyst were tuberculous and numerous tubercle bacilli could be demonstrated in the sections. Both tubes and the dermoid were perfectly free from tuberculosis.

An interesting point in connection with this case was the fact that the woman developed marked ascites shortly after the operation. No doubt the traumatism from the operation which was rather severe, due to the many adhesions, produced this ascites. Frequently a simple laparotomy will improve cases of peritoneal tuberculosis but, on the other hand, marked trauma may also cause an exacerbation of the tuberculosis; an accident which I have seen also in other cases of genital tuberculosis of the female and to which I have called attention in another place.

About six months after the operation the patient died of cachexia. An autopsy revealed an atrophied uterus free from tuberculosis.

In 1916 at Tuebingen I saw a second case of tuberculous ovarian tumor. This time it was a solid adenofibroma of the left ovary with a tuberculous infection. This is the only instance in the literature of a solid ovarian tumor infected with tuberculosis with the one exception of Glockner's case where a medullary carcinoma and tuberculosis were found together.

This second case (R.K.J. Chart No. 719, 1916) was a sterile married woman of 43 who had had pelvic and abdominal pains for a long time.

Physical examination showed a large fibromyomatous uterus and large bilateral masses.

At operation, also under spinal anesthesia, marked perimetritis and double pyosalpinges were present. Both ovaries were firmly adherent to the tubes, the right one small, the left one firm, solid, about the size of a small orange. The peritoneum was not diseased. The uterus, both tubes and the left sided tumor, which was a fibro-adenoma as mentioned above, were removed and microscopical examination proved them to be tuberculous. The right ovary, which was also removed, was small, fibrotic and free from tuberculosis. Tubercle bacilli were again found in the sections from the ovarian tumor.

In connection with my two cases I went over the literature on this subject very carefully and found altogether 29 cases including my own, of proven tuberculous ovarian neoplasms. These were the following: 1. v.Baumgarten; 2. Bertino; 3. Brons; 4. Celler; 5. Elsasser; 6. Gade; 7. Glockner; 8. Gruenbaum; 9. Kelly; 10. Klebs; 11. Lagothetopulos; 12. Madlener; 13. Meriel; 14 and 15. Moench; 16. Neumann; 17. Olshausen; 18 and 19. Pollosson and Violet; 20. Pruesmann; 21. Rosenthal; 22. Saenger; 23. Sealone; 24 and 25. Schottlaender; 26 and 27. Todorsky; 28. Wechsberg; 29. Spencer Wells.

In this research I overlooked three cases as I found out later, namely, those of 30. Tusini; 31. Charbonnel and Nadal and, 32. Cohn. Since that time I can find only a single case, that of Forgue and Chauvin in the literature.

Among these 33 tumors 7 were intraligamentous, about a dozen were dermoids, and only 2—Glockner's case and my second one—were solid growths.

I realize that in many articles on this subject more cases have been reported than I have just named, but all of these so-called tuberculous ovarian cysts will not stand close investigation. Forgue and Chauvin for instance have left out many certain cases and included others which are not tuberculous cysts at all, so for example, the 4 cases of Simmonds mentioned in the beginning of this paper. Miss Gorowitz is another author who does not sift her material. As early as 1899 she claimed to have found 19 cases of tuberculous ovarian cysts although she only enumerated 10. The other 9 no one has ever been able to trace. Pruesmann—as mentioned—only discovered 14 such cases in 1904.

The following have all been cited as tuberculous ovarian cysts but are in reality either tuberculous abscesses, infected follicles, corpus luteum cysts, or infected peritoneal sacculations: 1. Bouget and Albertin; 2. Edmunds; 3. Ehrendorfer; 4. Goullioud; 5. Griffiths; 6. Grusdew; 7. Heiberg; 8. Hofmeier; 9. v.Krzywicki; 10. Sturges; 11. Mangold. Remy has also eliminated the following in addition to the

above: 12. Brouardel; 13. Schreiber; 14. Jacobs; 15. Wolff; 16. Phocas; 17. Schwartz. Rives, Guillemain, and Mangiagalli as 18, 19 and 20 must also be excluded.

To these 33 cases of tuberculous ovarian neoplasms I can now add a thirty-fourth which I saw recently at the New York Post-Graduate Hospital.

Dr. Ward J. MacNeal, Director of the Departments of Pathology and Bacteriology at the Post-Graduate Hospital, first called my attention to the pathological specimen. The woman was a private patient of Dr. H. Dawson Furniss and I want to thank both of the doctors at this time for their courtesy which enables me to present the case here.

The history is as follows: Mrs. R. P., admitted Dec. 5, 1922, to the Post-Graduate Hospital. Chart No. 26431, Pathological No. 7064-14065. She was an Italian woman 29 years old who had been married ten years and had never been pregnant. Her family history was negative.

Present history: The patient had been well, according to her own statements until August 12. At that time she had pain in the left adnexal region and from August 15 to August 18, 1922, a slight uterine flow. After that her menstruation—which before had always been regular—ceased. Her abdomen enlarged and she had nausea and vomiting lasting about 3 weeks.

Physical examination showed no general abnormalities. The abdomen, however, was enlarged and tender on the left side.

Gynecological examination revealed a large mass on the left side which could not be mapped out distinctly. It extended almost up to the umbilicus and projected below into the true pelvis. The culdesac of Douglas was filled out and felt more or less doughy. The uterus could not be isolated very well but seemed enlarged and irregular. A diagnosis was difficult but apparently a fibromyomatous uterus and an ectopic gestation were present.

At operation, under ether anesthesia, the uterus was found slightly enlarged but otherwise normal. The mass on the left side was a large pyosalpinx and an ovarian cyst the size of a lemon. On the right side a smaller pyosalpinx and a normal sized ovary were present. The adnexa of both sides were removed. The operation was extremely difficult due to many old firm adhesions to all the surrounding structures. The peritoneum itself was not diseased.

PATHOLOGICAL EXAMINATION OF THE SPECIMEN

Gross examination: The left tube and ovary, bound up in an inflammatory exudate and fibrous tissue, measured 110 x 63 x 64 mm. At one point the specimen had been torn and showed an irregular cavity 40 x 35 x 20 mm. which was lined by a hemorrhagic pyogenic

membrane. On section it was found that the cavity narrowed down on one side to 18 mm. and was continuous with the lumen of the tube. The walls of the latter were very markedly thickened by edema and inflammatory fibrous tissue.

The ovary itself measured 80 x 51 x 45 mm. It was rather soft. On section a cavity 45 x 35 mm. was filled with opaque greyish yellow grease and numerous blonde hairs. The latter had their origin in part in the smooth wall of the cyst. Other structures such as teeth, etc., were lacking. The average thickness of the cyst wall was from 3 to 5 mm. At one end the ovarian tissue was 30 mm. thick, here a second smaller cyst filled with sebaceous material, was found.

The right tube and ovary also were bound together by adhesions especially at the fimbriated end which was closed. The tube itself measured 105 mm. in length and varied in thickness from 8 to 25 mm. Its lumen was filled with opaque yellowish grey muco-pus. The wall was 5 to 14 mm. in thickness. The ovary measured 58 x 45 x 27 mm. On section it was edematous and contained numerous follicular cysts up to 35 mm. in diameter.

Sections were cut from the various parts of the specimen; they were hardened in formalin; embedded in paraffin and strained in the usual manner with hematoxylin and eosin.

Microscopical examination: Both tubes showed a huge chronic purulent inflammation throughout and in addition, in many areas numerous typical epithelioid-cell tubercles containing Langhans giant cells.

The sections from the left ovary presented an even more advanced picture of tuberculosis than the tubes. There were many tubercles throughout the ovarian stroma. The described cyst was lined by stratified squamous epithelium, beneath which there were abundant sebaceous glands and a few hair follicles. In direct proximity to these and the cyst wall itself there were again many tubercles.

The sections from the right ovary were unimportant except for numerous typical follicular cysts and a fair number of developing graafian follicles. Tubercles were not seen anywhere in this ovary.

Smears made from the tubes, stained by carbol-fuchsin and decolorized in acid alcohol and absolute alcohol, showed numerous thin, often kinked, red bacilli.

Diagnosis: Bilateral tuberculous salpingitis.

Dermoid cyst and tuberculosis of left ovary.

Small cystic degeneration of the right ovary.

Here again, as in all the other cases of ovarian tuberculosis I have seen, the tuberculous process was present in only one ovary.

In closing I would like to say a few words regarding tuberculosis of ovarian cysts in general. I do not believe as Poncet and others

would have it, that tuberculosis is especially prone to cause ovarian neoplasms. Aside from the reasons already given it seems to me that if Poncet were right, bilateral tumors should be the rule instead of the exception. Secondly, genital tuberculosis is very often associated with thrombosis of the ovarian arteries. A thrombosis of the ovarian arteries, however, certainly would not only not be conducive to new growths in the ovary, but indeed would tend to cause cysts, which had already formed, to regress, due to the diminished blood supply. I do not believe however that anyone can decide definitely in cases of tuberculous ovarian cysts whether the tuberculosis was first or the ovarian tumor. Instead of the tuberculosis causing the cysts it is just as feasible to suppose the ovarian cysts had caused a *locus minoris resistentiae* which would allow the tuberculosis to gain a foothold.

The mode of infection in these cases must be either hematogenous or by direct contact, that is, through the lymph channels. In my first case mentioned in this paper, a peritoneal tuberculosis was present but no tuberculosis of the tubes or uterus, so that a direct extension from the peritoneum to the ovarian cyst seems probable. A hematogenous infection certainly ought to have attacked the tubes also as they are so much more sensitive to tuberculosis. In the second and third cases no peritoneal tuberculosis was present but the tubes in each case were severely infected so that here too I believe we can think of an involvement of the ovarian tissue from the tubes through the lymph stream. Another possibility is that the tuberculosis was primary in the ovaries. This, of course, cannot be proven but does not seem probable in view of what has been said before.

In addition to the hematogenous, or the contact or lymph stream infection, a direct implantation of the tuberculosis may follow the tapping of an ovarian cyst accompanied by tuberculous peritonitis. Naturally such cases were much more frequent in former years when large ovarian cysts used to be tapped as a routine. A few cases of tuberculous ovarian cysts which had been tapped and showed a tuberculosis of the wall or contents have indeed been explained in this way. Nevertheless such obvious traumatism is not needed in every case and spontaneous rupture of the tuberculous process into the interior of an ovarian cyst may well occur.

BIBLIOGRAPHY

- Albrecht*: Gynäk. Rundschau, 1911, p. 518. *Amann*: Monatsh. f. Geburtsh. u. Gynäk., xvi, 586. *v. Baumgarten*: Virchow's Arch., 1884, xcvii, 11. *v. Baumgarten*: Verhandl. d. deutsch. path. Ges., 1904, No. 2, also Berl. Klin. Wehnsehr., 1904, p. 1097. *Binnecke*: Gynäk. Rundschau, 1911, p. 505. *Berkeley*: Jour. of Obst. and Gyn. Brit. Empire, 1903, No. 3, p. 31. *Bertino*: Gin. Rev. prat. Firenze, 1905, No. 2, p. 355. *Rev. de Gynäk.*, x, No. 2, p. 383. *Abstrakt in Jahresber. ueber d. Fortschr. a. d. Gebiete d. Geburtsh. u. Gynäk.*, 1906, p. 497. *Birch-Hirschfeld* in *Veit*: Handbuch d. Gynäk., 1910, v. 170. *Bouget and Albertin*: Soc. de méd. d.

Lyon, July 23, 1911, *Presse méd.*, No. 61, p. 638. Abstrakt in Jahresberichte ueber d. Fortschr. a. d. Gebiete d. Geburtsh. u. Gynäk., 1912, p. 300. *Brons*: Inaug. Diss., Berlin, 1911. *Brouardel*: Thèse de Paris, 1865. *Browning*: Month. Cycl. and Med. Bull., Phila., 1909, No. 2. *Celler*: Am. Jour. of Obst., 1904, 1, 478. *Charbonnell and Nadal*: Province med., 1912, p. 426. *Cohn*: Arch. f. Gynäk., 1912, xvi, p. 522. *Cohnheim*: see *Veit*, Handbuch d. Gynäk., 1910, v. 170. *Cornil*: Soc. Anat., May, 1905, p. 433, and July, p. 603. *Crucilhier*: see *Veit*, Handbuch d. Gynäk., 1910, v. 170. *Cummins*: Univ. of Penn. Bull., Dec., 1905, p. 272. *Edmunds*: Trans. Path. Soc., London, 1889, p. 210. *Ehrendorfer*: Wien. Klin. Wchnschr., 1896, p. 283. *Elsaesser*: Inaug. Diss., Tuebingen, 1899. *Forgue and Chauvin*: Rev. de Chir., Paris, 1919, lvii, 881. v. *Franqué*: Ztschr. f. Geburtsh. u. Gynäk., xxxvi, 185. v. *Franqué*: Ztschr. f. Geburtsh. u. Gynäk., lxi, 409. *Gade*: Norsk. Mag. t. Laegevid., 1892, No. 2, Abstrakt in Zentralbl. f. Gynäk., xvii, 597. *Garkisch*: Ztschr. f. Geburtsh. u. Gynäk., lxiii, 66. *Geurmell*: Rev. de Gynec., 1903. *Glockner*: Zentralbl. f. Gynäk., 1904, xxvii, 702. *Glockner*: Arch. f. Gynäk., lxxv, 86. *Goewitz*: Thèse, Paris, 1899-1900. *Goulioud*: Soc. de Chir., Lyon, 1905. *Greenberg*: Johns Hopkins Hosp. Rep., xxi, No. 2. *Griffiths*: Trans. Path. Soc., London, 1889. *Gruenbaum*: Nuernberger Med. Gesell. u. Poliklinik, June 27, 1912. München. Med. Wchnschr., 1912, p. 2029. *Grusdew*: Monatschr. f. Geburtsh. u. Gynäk., xii, 84. *Guillemain*: Rev. de Chir., 1894, p. 985. *Heiberg*: Virchow's Festschr., 1891, ii, 288. *Hofmeier*: Fraenk. Ges. f. Gynäk. u. Frauenheilkunde, Sitz., xxx, April, 1910. München. Med. Wchnschr., 1910, p. 1412. *Hollös*: Deutsch. Med. Wchnschr., 1912, p. 2407. *Horizontow*: Zentralbl. f. Gynäk., 1907, p. 1731. *Jacob*: Zentralbl. f. Gynäk., xvii, p. 75. *Jung*: Gynäk., Rundschau, 1911, p. 479. *Kelly*: Johns Hopkins Hosp. Rep., 1890, ii, 211. *Kelly*: Johns Hopkins Hosp. Rep., 1902, p. 141, also in *Keating's* Cyclop. of Dis. of Children, 1901, v, 927. *Klebs* (*Klebs and Ohlshausen, R.*): see *Ohlshausen*, in *Billroth-Luecke's* Handbuch der Frauenkrankheiten, ii, 702. *Konrad*: Zentralbl. f. Gynäk., 1904, xxviii, 1030. *Kroemer*: Deutsche Med. Wchnschr., 1911, p. 1057. *Kroenig*: Gynäk., Rundschau, 1911, p. 482. v. *Krzywicki*: Ziegler's Beitræge, 1899, ii, 295. *Labhardt*: Gynäk., Rundschau, 1911, p. 517. *Labhardt*: Ztschr. f. Geburtsh. u. Gynäk., 1912, lxx, 532. *Lagothetopulos*: Zentralbl. f. Gynäk., 1908, xxxii, 378. *Leriche*: see *Poncet and Leriche*. *Madlener*: Monatschr. f. Geburtsh. u. Gynäk., v, 621. *Madlener*: Zentralbl. f. Gynäk., 1894, xviii, 529. *Mangiagalli*: Ann. di obst. e di gin., 1912, p. 537. *Mangold*: The Infection of Tuberculous Cysts, Basel, 1895. *Martin, A.*: The Diseases of the Ovaries, Leipzig, 1899. *Martin, A.*: Monatschr. f. Geburtsh. u. Gynäk., 1902, p. 555. *Mayer, A.*: Gynäk., Rundschau, 1911, p. 716. *Menge*: Gynäk., Rundschau, 1911, p. 509. *Mérel*: Bull. d. l. Soc. Obst. et de Gynec., de Paris, No. 2, p. 732, 1913. Abstrakt in Zentralbl. f. d. ges. Gynäk. u. Geburtsh., 1914, iv, 321. *Merletti*: Ann. di Obstet. e Gin., Naples, viii, 11. *Moench*: Gynäk., Rundschau, 1916, No. 5 and 6. *Moench*: Gynäk., Rundschau, 1917, No. 23 and 24. *Moench*: Der Frauenarzt, 1917, No. 9. *Neu*: Med. Klin., 1911, vii, No. 32. *Neu*: Gynäk., Rundschau, 1911, p. 516. *Neumann*: Verhandl. d. Gynäk. Sect. d. schwed. Aerzte, Stockholm, Hygiea No. 11. Abstrakt in Jahresber. ueber d. Fortschr. a. d. Geb. d. Gynäk. u. Geburtsh. 1913, p. 89. *Ollivier*: Thèse de Lyon, 1912. *Olshausen*: see above by *Klebs*. *Olshausen*: Ztschr. f. Geburtsh. u. Gynäk., 1901, xlv, 377. *Oppenheim*: Inaug. Diss., Goettingen, 1889. *Orthmann*: Zentralbl. f. Gynäk., 1888, p. 754. *Patel*: Jour. de Sages Femmes, Jour. No. 41, p. 274 and 281. Abstrakt in Zentralbl. f. d. ges. Gynäk. u. Geburtsh., ii, p. 475. *Peisser*: Monatschr. f. Geburtsh. u. Gynäk., 1913, xxxvii, 522. *Penrose*: Textbook of Diseases of Women, 1908, p. 388. *Pewsnor*: Thèse de Lyon, 1913. *Pillaud*: Thèse de Paris. *Pollosson*: Soc. de Chir., Lyon, 1905. *Pollosson and Violet*: Ann. de Gynec. et d' Obst., Oct., 1905. *Pollosson and Violet*: Lyon Chir., x, 340. *Poncet and Leriche*: Acad. de med. de Paris, June, 1910, p. 504. *Poncet and Leriche*: Lyon Chir., 1914, xi, 1. *Pruessmann*: Arch. f. Gynäk., lxxviii, 769. *Remy*: Thèse de Lyon, 1905. *Rives*: Thèse de Montpellier, 1909 and 1910. *Rosenthal*: Tuberculosis of Ovarian Tumors, Monatschr. f. Geburtsh. u. Gynäk., 1911, xxxiv, 302. *Saenger*: Zentralbl. f. Gynäk., xiv, p. 522. *Scalone*: Folia gin. Pavia, iii, No. 3, p. 521. Abstrakt in Jahresber. ueber d. Fortschr. a. d. Geb. d. Geburtsh. u. Gynäk., 1910, p. 134. *Schlimpert*: Arch. f. Gynäk., xiv, No. 3. *Schottlaender*: Monatschr. f. Geburtsh. u. Gynäk., 1897, v, 321 and 448. *Schmorl*: The Histologie-pathol. Exam. of Tissues, 1912. *Sellheim*: The Normal Situs of the Organs in the Female Pelvis and the Most Common Anomalies of Development, Wiesbaden, 1903. *Sellheim*: Gynäk., Rundschau, 1911, p. 515. *Sellheim*: Muenchen, Med. Wchnschr., 1911, p. 1657. *Sellheim*: Der Frauenarzt, xxvii, No. 6. *Simmonds*: Arch. f. Gynäk., lxxxviii, 29. *Spaeth*: Inaug. Diss. Strass-

burg 1885. *Spencer*: Brit. Med. Jour., 1914 No. 204, p. 83. *Sturges*: St. George Hosp. Rep. I. Abstrakt in *Virchow and Hirsch's Jahresbericht*, 1866, ii, 3. *Terülon*, see *J. W. Williams, Tixier*: Lyon méd., 1905, i, 458. *Todorsky*: Thèse de Montpellier 1913. *Turner*: Trans. Obst. Soc., London, 1889, xli, 4. *Tusini*: Ginecologia, 1904, No. 22. Abstrakt in Zentralbl. f. Gynäk., 1907, p. 1020. *Veit*: Handbuch der Gynäk., ii, iv-1, iv-2, v. *Violet*: see *Pollosson and Violet*. *Wechsberg*: Monatsschr. f. Geburtsh. u. Gynäk., xviii, 752. *Wells*: Trans. Path. Soc., London, 1863, p. 64. *Williams, J. D.*: Med. Press and Circ., London, No. 4, p. 228 and No. 55, p. 18. *Williams, J. W.*: Johns Hopkins Hosp. Rep., 1893, iii, *Wolff* see, *A. M. Martin*, Monograph.

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Society Transactions

TRANSACTIONS OF THE AMERICAN GYNECOLOGICAL SOCIETY

FORTY-EIGHTH ANNUAL MEETING

HOT SPRINGS, VIRGINIA, MAY 21-23, 1923

DR. THOMAS J. WATKINS, Chicago, Ill., read a paper entitled **Cystocele and High Rectocele**. (For original article, see p. 389.)

DISCUSSION

DR. FREDERICK C. HOLDEN, NEW YORK CITY.—Cystocele, a simple lesion easily cured. I take it that a few years ago such a statement would not have passed unchallenged.

During the last decade there have been several interesting and more or less satisfactory operations proposed for the cure of cystocele and rectocele by members of this Society. The problems involved have been the etiology, the anatomy of the parts involved, and the operative procedures for the cure of the defects. Dr. Watkins' very sane conclusions as to the etiology, and his very convincing presentation of the subject, would lead one to believe that he has justified the title of his paper. Those of us who were in Chicago recently were very much interested in the presentation at his clinic at St. Luke's Hospital; so much so that upon my return to New York I started to familiarize myself with the steps of the operation there demonstrated, and thus far I have been so pleased with the satisfactory results that I am led to believe that when I perform this operation with the precision and refinement of technic as demonstrated by Dr. Watkins, I will then have an operation as satisfactory in my hands for the younger women, as is the interposition operation in women past the childbearing period.

Those of you who have not been to Chicago and seen Dr. Watkins demonstrate this operation have yet in store one of the most delightful treats you have ever had.

DR. WILLIAM C. DANFORTH, EVANSTON, ILLINOIS.—I have met the problem of the high rectocele in a manner a little different from that described by Dr. Watkins. A woman presented herself with a high rectocele coming from the cervix down, and rolling out the entire perineum and rectum. I have dissected up to the level of the cervix, freeing the vaginal wall from the rectum, extending dissection up behind the cervix. Then by passing sutures through the upper part of the levator on one side, through the posterior surface of the cervix and through the levator of the opposite side, the levators and cervix were made to form a continuous wall which retained the prolapsing bowel.

DR. WILLIAM E. STUDDIFORD, NEW YORK CITY.—In reference to high rectocele, I think there are two types of cases, one in which we have an elongation of the culdesac in which the culdesac of Douglas pushes down the posterior vaginal wall, causing a real hernial sac, and often that sac is filled with loops of small intestine and the protrusion comes down posterior to the cervix.

There is another type of case in which the culdesac does not descend as far, but we have a protrusion of the anterior wall of the rectum and posterior wall of the vagina. The handling of these cases operatively is a little bit different. Where Douglas' pouch comes down I follow high dissection as Dr. Watkins has described, but in a little different way. I start a midline incision at the cervix and make a dissection of the mucous membrane, opening the culdesac, so that the peritoneum is exposed, and with the finger it is possible to find out the amount of that descent. The peritoneal pouch is freed and the hernial sac closed, as the hernial sac or peritoneal sac in an inguinal hernia. Having done that, the sacrouterine ligaments are exposed, and it is possible by shortening them and bringing the edges of the fascia together to draw up the rectum and restore some of the attachments of the rectum at the sides of the sacrouterine ligaments, and to get fascia very much as Dr. Watkins has described, although approaching the problem from a little different direction. Where you have protrusion of the anterior wall of the rectum, the fascia must be brought up and drawn upward, and you have more of a transverse slit, as described by Dr. Watkins. The removal of the peritoneal pouch, I think, is a great help in curing these cases of high rectocele in which the pouch is elongated.

DR. GEORGE H. NOBLE, ATLANTA, GEORGIA.—There are two general conditions in cystocele requiring attention, one due to trauma, and the other to excessive deposits of loose connective tissue.

Those due to trauma may be divided into two subdivisions: the first due to lesions of the fascia underlying the bladder, and the other to lesions of the uterine supports and pelvic floor. The cases due to excessive deposit of loose connective tissue may be divided into two subdivisions, also: first, deposits of loose connective tissue around the uterus and below the base of the broad ligaments; second, cases including the above with deposits of loose connective tissue in the middle portion of the cervix uteri.

The general principles involved in operating are constant, though the technic may vary according to the divisions mentioned or the operator's ideals.

Fascia lying beneath the bladder should be brought together from all directions to distribute tension on all sides of the pouch between uterus, broad ligaments and anterolateral walls of the pelvis. For this purpose, the kite or diamond shape excision of anterior vaginal wall (including fascia) is eminently satisfactory.

Excessive deposits of loose connective tissue are usually connected with pronounced uterine descensus, or hypertrophic elongation of the middle portion of the cervix, with eversion of the vagina. Such cases require either hysterectomy or resection of the portio media with wide dissection, the latter for the purpose of replacing loose connective tissue with scar tissue.

In all cases, lesions of the uterine supports and pelvic floor should be repaired.

I deal with large rectocele differently from most people. In the first place, after separating the rectum from the vagina, I evert it through the anus, cut off the sac, and close the hernial opening by bringing the normal rectovaginal septum to the fascia, covering the inner layer of the levator muscle, suturing with kangaroo tendon; then close the perineum in layers. Small rectocele is dealt with as in ordinary perineorrhaphy, by passing suture well around the hernial opening in the rectal fascia, and bringing the upper edge of the hernial opening down to the fascia covering the inner surface of the levator ani muscle.

DR. WATKINS (closing).—I thank Dr. Holden for his kind remarks, which, I am sure, are more complimentary than deserved. We have attempted in case of high rectocele to bridge over the lesion by means of the levator ani and the broad ligaments, as Dr. Danforth has suggested, but the results were very unsatis-

factory. We approve of obliteration of the deep culdesac, which Dr. Studdiford mentions and which is noted in the paper. We have become thoroughly convinced that wide dissections in cystocele are unnecessary and often harmful, for reasons given in the text. It is never necessary to narrow the vagina except as it is narrowed from excision of redundant mucosa. I have been familiar with Dr. Noble's operation for rectocele since he described it, many years ago. I have not had the courage to do it, although otherwise it has had my approval.

DR. OSKAR FRANKL, Vienna, Austria, read a paper entitled **Relation between Placenta and the Secretion of Milk.** (For original article, see p. 399.)

DISCUSSION

DR. HUGO EHRENFEST, ST. LOUIS, MISSOURI.—The interrelationship between the breast and genital tract has, of course, been known for a long time. The gross stimulus must come from the genital tract. We know that breast development coincides with the menarche; that during menstruation often some stimulus reaches the breast; that at the time of the menopause there occurs an involution of the breast glands. As we now understand the problem of menstruation, we might assume a relation of breast changes more directly to corpus luteum function. That gives us some clue as to what probably happens during pregnancy. We know that during pregnancy ovulation ceases; the corpus luteum becomes larger and persists. We might then assume that it is the large corpus luteum which causes the growth development of the breast in the course of pregnancy. The more difficult problem, however, is to explain why the lactation process, the real functional activity of the hypertrophied breast gland, does not begin until labor is over. Professor Frankl deals with this problem. Naturally, outside of the ovaries we have to consider in this connection the uterus and its contents, the uterine wall, the fetus and the placenta. He has referred to the manner in which these various factors have been excluded. It is a common observation that a Porro extirpation of the uterus, does not interfere with lactation. This proves that involution of the puerperal uterus, as has been claimed, is not the deciding factor in starting lactation. Observations in cases of hydatidiform mole exclude the fetus as the activating factor. Thus, by exclusion, the placenta suggested itself as the determining factor. The placenta, however, was not acknowledged to be an organ endowed with internal secretion. Some of the experiments made with placental extracts were suggestive, but never conclusive, because after all, one always had to discount the possibly misleading effects from the injection of protein substances, i. e., possibly nonspecific effects.

In experimental endocrinology most reliance always is placed on the results of the successful transplantation of organs which are functioning abnormally. Just in this manner Professor Frankl has solved the problem of the inner secretory function of the placenta and its relation to lactation by his ingenious experiments, which he described in the paper just presented.

There is another interesting side to this subject. Experiments made by Herrman demonstrated that a lipid isolated by him from the corpus luteum biologically and chemically is identical with a lipid extracted in the same manner from fresh placenta. The most characteristic effect he obtained with these very powerful lipid extracts was a growth stimulation of the breast gland even in new born animals.

Still another very important conclusion can then be drawn from Professor

Frankl's experiments. If corpus luteum and placental lipoids are identical, we can readily support Professor Frankl in his assumption that during pregnancy the placenta takes over or reinforces the activity of the corpus luteum. I consider this a point of great significance in relation to certain therapeutic suggestions that have been made, and which in our literature do seem to play an important rôle. If the placenta supplants or reinforces corpus luteum function, it is difficult to see how corpus luteum injections could ever be required in early pregnancy to overcome certain toxemic symptoms, just at the time when the chorion epithelium surely is most active.

We have read in American and also in German literature about the wonderful effect of placental tissue and extracts in increasing the milk supply of the nursing mother. It is hard to understand any such effect of placental extract when we are in possession of scientific proof that the placenta stimulates growth of the breast glands, but undoubtedly also actually inhibits the production of milk.

Having been familiar with Professor Frankl's experiments for some time, the thought had occurred also to me that there exists a striking analogy between the appearance of the menstrual flow coincident with retrogressive processes in the corpus luteum, and the appearance of milk after the elimination of the placenta, both phenomena representing a dissimulation process setting in when the distinctly assimilating effect of corpus luteum or placenta has ceased.

I express to Professor Frankl my deep gratitude for having brought this interesting subject before the Society, and I ask him to consider in his concluding remarks the practical aspect of his experiments in regard to the use of corpus luteum extract in the treatment of the toxemias of pregnancy, and of placental extract for the purpose of increasing the milk supply of the nursing mother.

DR. RUDOLPH W. HOLMES, CHICAGO, ILL.—Why is it that most of the animals eat their placenta if it is not a part of the process of lactation?

DR. ARTHUR H. CURTIS, CHICAGO, ILL.—I would like to ask Professor Frankl whether he has given these pregnant mice any other subcutaneous implantation of foreign proteid material and has noted the effect of it on the offspring. Also, whether he has implanted other foreign material subcutaneously, noting whether or not there was a toxic effect, or whether possibly transplantation of the placenta may not be of this nature rather than showing a specific action.

DR. FREDERICK J. TAUSSIG, ST. LOUIS, MISSOURI.—I would like to ask Dr. Frankl how long the placental implantations lived, or how long they may continue to function.

DR. CAREY CULBERTSON, CHICAGO, ILL.—I should like to ask Dr. Frankl what part of the placenta he used, whether it was the trophoblast, that is, early chorionic cells, or placenta at term. There is a distinct difference between the two. After midpregnancy there is a marked disappearance of the trophoblast, which is active very early during the development of the chorionic villus, whereas at full term the placenta is converted into old connective tissue, with a relative or marked degeneration of the trophoblasts. I ask this question for the reason that before the placental extract was put on the market I was provided with it by one of the manufacturing chemists, for the purpose of using it clinically in obstetrical wards in determining whether it was of any value or not in increasing the secretion of milk. I reported to the firm it was of little or no value and had no influence whatever in modifying in any way the secretion of milk in the mother. There were then later reports, as Dr. Ehrenfest has indicated, to the effect that the secretion of milk has markedly increased by feeding

the woman placental extract. At the time I tried to secure from the manufacturers through their agents some statement as to what part of the placenta had been used, whether they used early chorionic villi, early placenta, or placenta at full term to make the extract, and I was unable to get an answer to that question.

DR. HENRY T. BYFORD, CHICAGO, ILL.—To try to find an internal secretion or a specific stimulant in the placenta responsible for the secretion of milk seems to be complicating a subject that in the last analysis will probably be found to be quite simple. Instead of being a producing organ like the ovary and endocrine glands, the placenta is an organ that is produced during pregnancy for a specific function. Whatever action it may have upon the secretion milk is probably a nonspecific protein stimulant and entirely secondary. The genital influence connected with pregnancy is undoubtedly due to the functions of the ovaries aided by the various endocrine glands. The mammae are stimulated by this influence which, when the uterus is evacuated and reduced to a comparatively quiescent state is suddenly concentrated upon the mammae, while the placenta, having been expelled, must stop exerting any influence from one to three days before milk is secreted, and when its influence should be needed most.

There are many nonspecific stimulants to the secretion of milk, such as nursing, hot nourishing drinks, and perhaps certain proteid or other stimulants acting by way of the blood or nervous system, and it is right that the placenta should be experimented with; but too much time is apt to be consumed in premature discussions.

DR. FRANKL (closing).—As to the question of the age of the placenta which I implanted, I will say that I worked on animals about ten to twenty days before expected delivery and transplanted on them placentae of mice in the same stage of pregnancy. This, however, is not very important for experiments on rodents, because in them the trophoblast persists until the end of pregnancy. There is no degeneration of the trophoblast as occurs in human placenta.

The question was asked whether I tried the transplantation of the ovary in these experiments. No, I tried to replace only a missing organ for the purpose of my studies. The grafted placenta remains active about four weeks, as a rule. After the fifth week it disappears.

I am not convinced that the injection of placental extract preparations or placental tissue increases the secretion of milk. If there was a simple way of treating insufficient lactation, it would be practiced in all clinics of the world. We had no results from using placental extracts for this purpose. With lactation already established every factor which produces hyperemia should theoretically increase secretion, but we have no evidence that this occurs with injection of placental extracts.

DR. HAROLD C. BAILEY AND DR. WILLIAM P. HEALY, New York City, read a paper entitled **Follow-up Results of 908 Cases of Uterine Cancer Treated by Radium.** (For original article, see p. 402.)

DISCUSSION

DR. WILLIAM S. STONE, NEW YORK CITY.—I am naturally much interested in this report by Dr. Bailey and Dr. Healy because the majority of cases I have examined with them and have discussed frequently the treatment of the cases. I think perhaps I ought to explain a little my personal attitude.

Last night I was introduced as the radium fiend of New York. I assure you,

that is not my reputation in New York. I flatter myself that most men think I proceed very cautiously in this work. My work is really that of a policeman and I am a good deal of a pessimist. I have adopted my present attitude in this matter during the past two years. In all this list of cases the percentage of cures cannot be compared with anything in regard to surgery, because, with few exceptions, it represents a definite percentage of cures in cases in which surgery can do nothing at all. In some of the cases that Dr. Bailey has classified as operable, I disagree with him a little bit about the stage of the disease. I am rather inclined to think that they were a little farther along in the disease than he thinks, and the term operability has such a wide variability and is so dependent upon the personal equation, that it is a difficult term to use in any scientific way. In addition to that, I have nine private cases that were seen so early that I thought a simple hysterectomy could cure. These were cases of cancer of the cervix. Of these nine cases, three have passed the five year period, and the last one has gone a year and a half since the termination of treatment. All of these cases are well at the present time. As I say, three of them have passed the five year period. These cases I deliberately radiated, recognizing that surgery probably could have cured them also.

So far as cancer of the cervix is concerned, I believe now we have got into another era in the discussion of the subject, and still most of us believe in radium as a palliative measure. I think that we must in the light of these statistics consider the thing somewhat from a curative standpoint, and I think in individual instances it may often depend on the resources that the patient has, whether she has the benefit of the best surgeon, or whether she has the benefit of a very experienced man in the use of radium.

As far as cancer of the body of the uterus is concerned, while I believe we have shown radium has been curative, at the present time in the presumably early cases I cannot conscientiously rely upon radium alone, for the reason that I cannot see the lesion, I do not know exactly where it is, and I do not think we are quite ready, if we have the surgical resources, to treat the case with radium alone.

In regard to palliation, all has not been said that should be said. There are certain classes of cases in the terminal period of the disease that have been made much worse. It is awfully hard to estimate how much palliation you give in any case, and by how much life has been prolonged, but I am sure that there is another side to the palliative treatment. Undoubtedly some of our cases have been made worse, they have lived a shorter time, and have suffered more.

In the terminal period there are two kinds of cases, one in which the local disease is far advanced, and the general condition shows they are in the terminal period. These cases should not be treated. The other class is pretty close to the terminal period, and the woman's general condition appears to be good on examination, but you will find the case is very likely advanced, and the nutrition of the tumor is beginning to be disturbed. It has not been disturbed before that. There is no toxemia, and so on, but you can see it is already breaking down. If you use radium in that case you will make the patient prematurely worse. These are the hardest cases to withstand.

With reference to the technic, I am not so enthusiastic about external radiation with the x-ray. I believe in advanced cases as a palliative measure it should be done, but there is one thing I have learned from observation of the effect of these agents upon tissues in other parts of the body, that it is quite necessary to observe the nutrition of the normal parts surrounding the tumor. I am not quite sure but what we are going to have a backfire from the intensive use of the x-ray. It is dangerous, and the dangers may not be shown sometimes for

several months, and the x-ray does cause a change in the nutrition of the normal surrounding parts, which is a great disadvantage.

DR. OSKAR FRANKL, VIENNA, AUSTRIA (by invitation).—I agree with very much Dr. Bailey has said.

When we began radiation of these cases in our clinic we started with radium. The primary results were excellent, but after a short time they proved disappointing. Later, when we learned to improve the technic of radium application, the primary results became much better, and yet the ultimate results were absolutely unsatisfactory. It was only when we began to combine radium with the x-rays that our results were markedly improved.

Regarding the operative treatment of these cancerous cases, we should operate whenever we think it is possible to do so to advantage. After operation we treat these cases by radiation, but only by means of x-ray, excluding radium. Since we have followed this method we have cured very many cases. I have not the statistics at my disposal at this time.

I am sure Dr. Bailey has also studied the interrelationship between mature carcinoma, and the finer histological structures of the growth, and the results of radium and x-ray treatment. In our clinic, as in other clinics, it was found that there is a very great difference between radiation of the one or another carcinoma, according to its maturity. We have carcinomas which will melt like butter in the sun, and again others which prove very refractory. We have patients who respond very satisfactorily, but these are cases of solid carcinoma that have reached an advanced state of maturity. The old surgeons knew that an epithelioma of the skin cannot be compared in malignancy with the carcinoma of the tongue. The worst carcinomas, according to our experience, are always those of the glandular type of low maturity.

DR. GEORGE GELLHORN, ST. LOUIS, MISSOURI.—Limiting myself to cancer of the cervix, I will say that Dr. Bailey's figures confirm the continental statistics according to which radiation rivals, if not excels, the results of surgery by a permanent and absolute cure of between twenty and twenty-five per cent. It must, however, be obvious to you that if the rest of us are ever to achieve such results, larger quantities of radium must be at our disposal than most of us possess. Those of us who have only 100, 130 or even 150 milligrams of radium, are forced to combine radium with operation in early cases. We first destroy the cancer in the cervix by radium, and then remove by operation the tissues outside of the uterus where the radium cannot penetrate. To do this, and this is the point I want to stress, we must resort not to an ordinary hysterectomy, but to the extended Wertheim operation despite its high primary mortality.

The second point I wish to make refers to certain forms of recurrences. Local recurrences in the operative scar in the roof of the vagina are not nearly so frequent as they formerly were when direct contamination was less carefully avoided during operation. We are now more apt to meet with recurrences in the outer portions of the parametria close to the pelvic walls. In this location the cancerous foci are not directly accessible to the radium capsules or needles, and any intravaginal radium application carries with it the danger of vesical or rectal fistulae. For this class of cases the suggestion made by Bumm a year or so ago seems to me worthy of attention. Bumm approaches the pathologic process by the paravaginal route, and I have followed his lead, substituting needles for capsules. It is easy to make a small puncture close to the tuberosity of the ischium and, with two fingers in vagina and rectum, guide a prostatic needle containing radium into the tumor itself. Two or more such needles can be introduced and left in place to correspond to 300 or 400 mghr. I have done this three times thus far.

In the first case the radium dosage was insufficient, and the tumor seemed to have been stimulated to faster growth. In the second case, the tumor disappeared promptly, but it is too soon to speak of definite results. The third case is altogether too recent; moreover, deep x-ray treatment was added to the radium application. I wonder whether others have had experience with successful treatment of such deposits far out to the side of the pelvis.

DR. JAMES E. KING, BUFFALO, NEW YORK.—The thing which most impressed me during the reading of the paper is the undertone of disappointment that pervades it. It suggests what many of us feel, that radium is not fulfilling the high hopes at first entertained as to its value as a cure of cancer of the cervix. These reports, too, have great significance for those of us who have only a limited amount of radium at our disposal. I have had 100 mg. of radium for about a year and a half and, it seems to me, that it is time for us to learn whether the use of these small quantities is of as great value as the larger amount.

In estimating the value of radium as a cure for cancer we often ignore a fact which we all learned in the operative treatment of cancer. We all realized that there was some factor other than the technic and skill of the surgeon which determined whether an operation was to be successful as a permanent cure, and upon which also depended the time at which recurrence would take place. For this reason none of us, as far as the surgery of cancer was concerned, ever had the temerity to make a prognosis as to cure, or to predict the time of recurrence. This factor we know nothing about. Call it immunity, resistance, or what you will, but until we do know what that factor is we cannot determine the practical value and the dose of radium for a given case. On account of this unknown factor radium as a cure for cancer of the cervix shares the same uncertainty as its treatment by surgery.

I would be glad to have Dr. Bailey express his opinion as to the smaller amounts of radium, compared with the amounts available in his own and other institutions.

DR. WILLIAM P. HEALY, NEW YORK CITY.—In 1921, when Dr. Bailey went to the Department of Obstetrics at Cornell, and I was asked to succeed him at the Memorial Hospital and to take over the work in gynecology, I was sure I had a fairly good knowledge of cancer of the cervix because I had been associated with Dr. Howard C. Taylor at the Roosevelt for twelve years, and also had my own service at Fordham Hospital. Yet when I went to the Memorial Hospital I discovered very promptly we had been greatly restricted on those services in our efforts to take care of cancer of the cervix. I found that at the Memorial Hospital we were taking care of cases I had never before appreciated could have the lesion treated to advantage by any physical agent.

In 1921 there were eighty-five primary advanced cases of cancer of the cervix totally beyond the possibility of surgery, and of those cases there are thirty-one alive today, and twelve absolutely free from any evidence of cancer.

Last Wednesday, a week ago, there came to my clinic a woman thirty-five years of age, who applied for treatment in July, 1921. She was a graduate nurse, yet when she applied for treatment the disease had completely invaded the cervix, so that it was like a horse collar with a solid ring, with the base of each broad ligament solid, and the uterus firmly fixed. She came in a week ago today with no local evidence of disease in her pelvis, apparently in perfect health and with no symptoms of any kind. When we asked her to return in September for the next examination, she asked that it be put over until October because she was going to attend a convention some place in the western section of the country.

She is one of the twelve cases entirely free from disease. These are the primary advanced cases.

DR. BAILEY (closing).—I was much interested in what Professor Frankl said in regard to the maturity of the cells. We have based our work upon the morphology of the cell, but in a somewhat different way. The squamous cell carcinoma is a resistant tumor, but, on the other hand, it is a tumor which tends to be very sharply localized and therefore, our results are better from that particular type than from any other. The columnar cell carcinoma, or the one which appears like adenocarcinoma, is easily affected by radium. The trouble is that it may extend far beyond any point where one may judge it to be. It is a rapidly spreading tumor and goes outside the bounds where you can give a satisfactory dosage. A third kind is the basal cell tumor, which is easily affected, but is not common in this location.

In regard to Dr. Gellhorn's question, I believe that a man with a small amount of radium has no business attempting to treat these operable cases with radium alone. It should be used in conjunction with operation. I feel certain on that point. In regard to recurrences in those areas that are far out in the pelvis, the paravaginal incision suggested by Dr. Gellhorn is interesting.

There is another point I wish to speak of, because it is so seldom referred to, and Dr. King brought it out. There is no way of telling what the reaction is going to be. Individuals have a different type of immunity against cancer and the cells have a different virility, and besides that, there is a general blood reaction to the irradiation in some cases that does not occur in others. There is a limiting of the tumor growth by a dense infiltration of plasma cells and leukocytes.

DR. CURTIS.—How about the treatment of carcinoma of the fundus?

DR. BAILEY.—Carcinoma of the fundus should be operated on in conjunction with the use of radium. It should have, first of all, a heavy sterilizing dose of radium, and then the uterus should be removed.

DR. FRED J. TAUSSIG, St. Louis, Mo., read a paper entitled **Contributions to the Pathology of Vulvar Disease**. (For original article, see p. 407.)

DISCUSSION

DR. OSKAR FRANKL, VIENNA, AUSTRIA (by invitation).—I wish to add only a few words to the excellent paper of Dr. Taussig. We must feel very grateful to him for having pointed out the fact that kraurosis is not a disease, but only a symptom. It does not offer a sharply defined pathologic picture, and that is the reason why I contradicted Veit who took the stand that kraurosis vulvae is a place in which a carcinoma will develop. We must not make the mistake and confound kraurosis vulvae with leukoplakia, and I think Dr. Taussig is right, when he says that carcinoma originates on the basis of a leukoplakia.

I cannot agree with the essayist as to the word "precancerous." I think we would better eliminate the word precancerous or preareinomatous from our medical terminology. There does not exist in my judgment a preareinomatous condition. We either have a carcinoma or no carcinoma. Preareinomatous is a word without a real meaning. We can say that the leukoplakia vulvae is the place of predilection for the development of cancer. The word preareinomatous unavoidably has led to many operations that are not indicated. I believe we should drop this term from our medical terminology.

DR. WILLIAM P. HEALY, NEW YORK CITY.—At the Memorial Hospital, New York City, we see a fair number of cases of leukoplakia of the vulva, and we have treated some of them with electrocoagulation, with reasonably good results so far as clearing up the lesions is concerned. This method of treatment has only been used for a short time on several of these cases, so that we do not know how permanent the result is going to be, but the immediate result has been the replacing of the leukoplakic area with normal skin subsequently.

As a part of the contribution to the pathology of vulvar diseases, I want to draw attention briefly to a case of estheomene under my supervision which I published early last fall in the AMERICAN JOURNAL OF OBSTETRICS AND GYNECOLOGY. It was an unusual case in which we finally concluded that the etiologic agent in maintaining the lesion was evidently a proteus organism, because we finally cured this young woman by the use of proteus vaccine.

DR. TAUSSIG (closing).—With reference to the use of the word precancerous, I spoke of "so-called" precancerous lesions. We should have some term for those lesions, favorable soil, on which cancer tends to develop, and if some one can suggest a better name for these lesions I would be glad to use it. Leukoplakic vulvitis is followed in fifty per cent of the cases by cancer. This soil predisposes to cancer and some term should be adopted to designate that kind of lesion.

As to the treatment of these cases, I feel anything in the way of cauterization or radium produces but temporary effect. I have tried radium in a number of cases with only a short period of relief. The x-ray likewise gives temporary results. Excision, on the other hand, gives satisfactory results. The percentage of recurrences after excision would not run over twenty per cent. The entire figure-of-eight involvement around the vaginal orifice and around the anus, with the perianal tissue as well as the perivulvar must be removed in order to prevent such recurrences.

DR. JOHN OSBORN POLAK, Brooklyn, N. Y., read a paper entitled **Further Study of the Retained and Adherent Placenta**, an abstract of which follows:

Placenta accreta is a pathological entity and must not be confused with retention or adhesion of the placenta. In accreta the placenta is directly attached to the underlying muscle structures—no serotina can be demonstrated, neither can any line of cleavage be found. The placental tissue erodes itself into the underlying muscle and makes one continuous mass with the uterine wall. Such cases are of extreme rarity; only one instance of placenta accreta was observed in the study of six thousand deliveries in the obstetric service at the Long Island College Hospital. Three other cases have been seen by the writer in thirty years of consultation practice; of these only one recovered, the others died of hemorrhage, sepsis and perforation of the uterine wall which resulted from attempts at manual removal.

In placenta accreta, as there is no serotina, there is consequently no line of cleavage, hence when manual removal is attempted the placenta is removed piecemeal and with it portions of the uterine wall. This opens the uterine sinuses and subjects the patient to the dangers of excessive blood loss, perforation and sepsis. Its etiology, according to Frankl and confirmed by histological studies in our cases, is due to conditions which produce an absence of the endometrium. These are previous manual removal of the placenta, repeated curettage, uterine scars, fibromyomata and atrophy of the endometrium. Three of our cases had

had previous manual removals and one had been curetted three times just prior to becoming pregnant. Absence or atrophy of the endometrium permits the ovum to implant itself upon a basal membrane and erode itself into the muscular wall which is unprotected against the erosive action of the villi by the absence of a well defined decidua. The result is a truly adherent placenta invading, and intimately attached to, the uterine muscle with no line of cleavage.

The symptom complex is a placenta which fails to separate with the classical signs of separation: i.e., rise of the fundus, descent of the cord and vaginal bleeding. The uterus does not bleed in placenta accreta because the placental site remains completely covered with the attached placenta and no sinuses are torn open. Retraction occurs, except at the placental site, hence the shape of the uterus is usually asymmetrical, one cornu being more prominent than the other. Adhesion may be presumed if the placenta is retained for over two hours after the delivery of the fetus, in the absence of the classical signs of separation.

Under such conditions, having conducted the placental stage on proper lines: i.e., avoiding fundal manipulation and attempts at forceful expression by Credé, in the absence of the signs of separation the writer suggests that under most careful surgical asepsis, the uterus be explored with the sterile gloved hand, and if no line of cleavage can be demonstrated, attempts at manual removal be discontinued.

Two plans of treatment may now be instituted: (1) After aseptic preparation of the approaches, the cord may be tied and cut flush with the cervix and the interior of the uterus firmly packed with washed iodoform gauze. This will occasionally stimulate contractions and if the adhesion is incomplete cause separation in the course of forty-eight hours. If the placenta does not separate and deliver itself on the withdrawal of the gauze, further intravaginal procedures should be discontinued. (2) Abdominal hysterotomy offers a clean field for attempts at separation, and if no line of cleavage can be demonstrated on uterine incision, hysterectomy should be the method of choice.

DISCUSSION

DR. BARTON COOKE HIRST, PHILADELPHIA.—There are two points, it seems to me, that might be discussed in Dr. Polak's interesting and instructive paper. First, the incidence of placenta accreta. In upwards of 40,000 cases seen in my private and hospital service, I have only seen one case of true placenta accreta, so that it might be less frequently encountered than Dr. Polak's statistics would lead us to suppose.

The other point is with reference to the necessity of doing hysterectomy. My experience in the single case we have had would indicate that it is not always absolutely necessary. It took four or five days to get rid of the fragments of placenta, but eventually it was accomplished, and the patient ultimately made a perfect recovery.

I recall a case like the picture Dr. Polak showed of fibroid tumor of the uterus complicating pregnancy. When I saw the woman some four or five days after delivery, the separation and removal of the placenta had been accomplished, but there was then infection and necrosis of the tumor and I was obliged to resort to hysterectomy. The patient recovered. I should hesitate to subscribe unconditionally to the doctrine that every case of placenta accreta should be treated by hysterectomy. No doubt it is the treatment giving the best average results in the hands of a specialist, but it might be unfortunate to have the profession get the impression that a case of adherent placenta, difficult to extract, should be dealt with by a major operation.

DR. WILLIAM E. STUDDIFORD, NEW YORK CITY.—In reviewing the cases that have been under my charge at the Sloane in the past four years, we have had no case of this kind, barring one that possibly might be considered in this class, a case in which I feel there is very little to be gained so far as the management of it was concerned. The patient was a woman who had been subjected to a series of curettages, I think four or five, in the preceding five or six years, and who was admitted to the hospital at about the sixth month of her pregnancy with a premature labor, and was seen only by one of the internes. A macerated fetus was delivered, and the woman was sent back to the ward with no note as to the condition of the placenta. She was in the ward for about ten days, with very little bleeding from the uterus, and there was nothing abnormal as far as temperature was concerned. She was discharged at her own request, and reported at the clinic some six weeks later with hemorrhage. She said she had more or less constant dribbling of blood, and in reviewing the history of the case the question of malignancy of the body of the uterus came up. The uterus was enlarged. Under an anesthetic an exploratory curettage was made, and a mass of tissue removed which to the eye appeared to be malignant. An immediate hysterectomy was done, and to our surprise we found, instead of malignancy, placenta with the usual granulation tissue of the wall of the uterus. She had carried it for a period of six weeks, with no temperature, no infection, and the placenta had invaded the uterine wall. I can readily see that a case of this kind by manual manipulation, unless it was done under the most careful precautions, would lead to a very high mortality following sepsis, or any attempt to remove all the particles of placenta would cause perforation of the uterus.

I feel the condition must be one of extreme rarity, and as to the question of hysterectomy I quite agree with Dr. Hirst that it would depend a good deal on conditions under which the cases were managed. After attempts at manipulation had been made under unfavorable conditions, then the question of surgical treatment or a radical operation would be the only thing to consider. On the other hand, if the case is carefully managed from the start, it is quite possible the uterus might be preserved.

The question of etiology, to me, is the one of repeated curettage. It reverts back to the old subject which was discussed many times, the objection to curetting every uterus for slight bleeding. Practitioners will curette and curette these cases so thoroughly that the endometrium is practically destroyed, and the uterus is no longer a suitable organ for future pregnancy.

DR. OSKAR FRANKL, VIENNA, AUSTRIA (by invitation).—For a long time I have been greatly interested in the subject which Dr. Polak has brought before us. I distinguish very sharply between pseudoplacenta accreta and real accreta. What we call placental adhesion has nothing to do with placenta accreta. I am absolutely sure that if a placenta five or six or seven days after delivery separates by manipulation, it was not an accreta. When we have a real placenta accreta, its separation is absolutely impossible. In the immense material which passes every year under my eyes I recall but six cases of true placenta accreta, in which the organ was united with the uterine wall without the interposition of a decidua. I have here one slide which corresponds to the picture shown in my book on Gynecologic Pathology published in 1914. The villi are so intimately united with the uterine muscle that you can follow them for half a centimeter underneath the inner surface of the uterine wall.

How can we detach this placenta? Twice I have made postmortem examination on such cases and had the specimens before me on the table. It seemed that one should be able to force the placenta from the uterine wall, but it was

absolutely impossible. I found that I was tearing out pieces of the uterine wall. I know of a case, which occurred outside of our clinic, where a doctor tried to separate such a placenta and in so doing pulled off part of the uterine muscle. Dr. Polak correctly spoke of an anatomical placenta accreta in which a decidua does not exist.

With regard to the etiology, repeated curettage plays an important rôle, and so does submucous myoma. I saw cases of placenta accreta after a severe endometritis, but such cases are very rare, because with an endometritis of this sort pregnancy is not probable. In one case which I studied the entire mucous membrane was destroyed and the ovum was implanted directly in the uterine wall.

In a case of septate uterus, sometimes the implantation of the ovum on the septum leads to placenta accreta, because the septum often has an underdeveloped mucous membrane without glands, therefore no decidua forms. Where the decidua is absent, separation of the placenta is impossible. I have reported similar occurrences in instances of uterus bicornis, leading to placenta accreta when the mucous membrane of one horn was underdeveloped.

In the case of a total placenta accreta bleeding is impossible. I have seen five such cases. As a rule, in nine cases out of ten, the placenta is implanted without any decidua. In one case I recall the placenta was at least partially implanted on a decidua. I am able to show you the slide of such a case. It is from a myomatous uterus. The patient had a submucous myoma recognized before pregnancy. We advised operation, but she refused. She became pregnant, and was first seen in the third month of pregnancy. I again urged operation because we were convinced she had a submucous myoma; she finally consented. With the sole exception of submucous myomas we are conservative in the treatment of cases of myoma complicating pregnancy. You can see in this slide that she would have had a placenta accreta. We have seen in the clinic three or four such cases. I thoroughly agree with Dr. Polak that in cases of anatomical placenta accreta the indication is definite for extirpation of the uterus. In this slide you see that almost the entire placenta is directly attached to the uterine wall without decidua; only one part, about two centimeters, showing the interposition of a decidua between placenta and uterine muscle.

DR. CAREY CULBERTSON, CHICAGO, ILL.—Dr. Polak has made the point that placenta accreta is a pathological entity, and this may be accepted without much question. Poor decidual formation is a factor in its development, in all probability. In his particular case the presence of a submucous fibroid explains why the mucosa was atrophic, and hence why the decidua had poor material out of which to develop. We should not, however, look for placenta accreta in pregnancy at term only, but also in early pregnancy. I am satisfied that it is a factor in some abortions.

I have two uteri, both of which were removed years ago for uterine hemorrhage, before radium became the accepted treatment for metrorrhagia. I removed one of these organs myself, and the other was removed by a friend of mine, and in neither case had pregnancy been suspected. Chorionic villi and cells of the trophoblast were found penetrating into the muscularis. The question comes up whether in such cases, in which the diagnosis is properly abortion due to placenta accreta, the treatment should be hysterectomy instead of simple curettement; and further, whether such a case would be suitable for treatment by radium rather than by hysterectomy or curettement.

DR. HENRY T. BYFORD, CHICAGO, ILL.—I would like to ask if in these cases there is any immediate danger of hemorrhage or of sepsis if nothing is done. I wonder whether it can be determined immediately, and whether in such a case

it is safe to wait a day or two, make another trial and see whether it is really such a case, before resorting to the extreme measure of hysterectomy.

DR. EDWARD A. SCHUMANN, PHILADELPHIA, PENNSYLVANIA.—I should like to ask Dr. Polak whether he has any information which would lead him to believe that if a placenta accreta were allowed to remain *in situ* indefinitely, it would separate by necrosis, followed by absorption.

DR. FRED L. ADAIR, MINNEAPOLIS, MINN.—I would like to ask Dr. Polak how he differentiates clinically between placenta accreta and certain types of placenta which cannot be accreta, but which have to be removed piecemeal.

DR. POLAK (closing).—In answer to Dr. Schumann's question, I will say that there are photographs in the exhibit of a case from our clinic, operated on by my associate Dr. Jewett, of an abdominal pregnancy with the placenta implanted upon the peritoneal surface of the rectum and posterior uterine wall. This case illustrates the manner in which a placenta becomes attached to the underlying structures in the absence of a protective decidua. This patient was operated upon over a year ago, and because of diffuse attachment, and the absence of any line of cleavage, it was left *in situ*. Dr. Jewett and I examined this woman two or three days ago and the placenta can be found as an insensitive mass in the culdesac, about one-third its original size, still attached to the rectum and the uterus. It is being aseptically absorbed. The same thing might obtain in a uterus, were its interior not subjected to the migration of bacteria, but aseptic absorption and organization cannot take place in the presence of saprophytic organisms.

In reply to Dr. Byford's question, I would say that we have left the placenta in the uterus as long as five days in order to have it separate, and have seen such a placenta delivered spontaneously. What we have tried to bring out in this paper is, that placenta accreta is a different pathological entity from adhesive placenta. In accreta the placental tissue invades and destroys the uterine muscle wall. If you will look at the sections, you will note that the placental villi have grown in between the fibers of uterine muscle, and have penetrated almost to the peritoneal covering. One section, directly opposite the implantation of the cord shows the peritoneum as the only part of the uterine wall that is left intact. If that is so, there is nothing that can be done except hysterectomy, for attempts at separation mean perforation of the uterus. Whether our figure of incidence is wrong or not, I do not know. We simply reviewed the cases five years back and picked out the manual removals. Of these there were eight, and from among this number there was one case of placenta accreta.

The main point, it seems to me, between Dr. Hirst and Dr. Studdiford and myself is that we are talking about different pathologic conditions. Adhesive placenta is not a placenta accreta. Dr. Studdiford's case is illustrative of the latter condition.

Dr. Adair asked how to differentiate placenta accreta and other types of placenta which have to be removed in pieces. I do not know. What we have tried to do, and what we suggest is, that if the placenta is retained for more than two hours without bleeding then we explore the interior of the uterus, and if there is no line of demonstrable cleavage, get out. We can wait if we want to for the placenta to separate, but how long to wait I do not know. I have waited five days. If we cannot get it out without pulling it off and pulling pieces of the uterine wall with it, it is better to remove the uterus. I do not know how to make the differentiation clinically, but I would like some of you to tell me.

Department of Reviews and Abstracts

CONDUCTED BY HUGO EHRENFEST, M.D., ASSOCIATE EDITOR

Collective Review

Some Forgotten Nativities

BY ALFRED ELA, BOSTON, MASS.

THE kinship of obstetrics to religion is much closer than is generally recognized, and is manifested in most curious ways,^{5, 7, 8, 9, 10, 11, 24} although in recent centuries frequently concealed. A cross-section of Christianity, including the first century to the twentieth, will reveal much not patent to the superficial observer, a few instances of which are as follows:

I. The earliest extant hymnbook¹⁴ of the Church was lately discovered, and the publication of this once almost canonical book has excited the keenest interest in theological circles, especially in Roman Catholic ones, as to its nineteenth Ode, with its "impossibly early" details of the Virgin birth. A certain "retranslation into the original Hebrew" is a monument of misdirected learning, there being little doubt that the Odes' language was Syriac, and that they were written at Antioch about 90 A.D. This most important Ode (the nineteenth) is still a puzzle, and my attempted solution⁹ is still in manuscript for reasons stated in postscript hereto. The upshot of my manuscript (so far as pertinent) is that the Father actively assisted (as foreshadowed in the Obstetrical^{9, 32} Psalms of David) the painless delivery by the Virgin of a giant Child, at its own volition and after a protracted pregnancy,¹¹ then universally believed to be a concomitant of divine paternity.

The possible theologic connection between North Syria and Egypt is a matter of keen controversy,¹⁸ and is here noted merely as perhaps a bead on the chain running through this article.

II. Jesus' prolonged gestation was also believed in by the Sabaeans Christians of Arabia (Felix¹⁹). This southern Arabia has been so sheltered from outside influences that its synagogues today, alone in the Jewish world, are said to use the Targums¹⁵—commentary in the former vernacular, upon the Scriptures. This South Arabian Christianity is known to very few historians. Some of these Christians were evidently taken by the Arabians of Yemen (the chief local city) during their Moslem invasion of Egypt and of Spain.

III. This invasion of Egypt brought intimate contact with the Christians there, of the Coptic Church, one of the earliest, but whose very existence was forgotten in Western Europe for many centuries. They preserve the oldest extant manuscripts of the New Testament, and constitute one of the most conservative races of mankind. Ac-

cordingly, Christianity doubtless changed them but little from their ancient beliefs,^{22, 23} and a detailed comparison of the iconography of Isis²⁶ with that of the Blessed Virgin would be most interesting and valuable. A single citation⁴ of a Nativity on an early fresco in a chapel of the Virgin must here suffice. On a bed (according to a tradition differing from our accepted one, but which has also survived in out-of-the-way Western Christianity) reclines the Blessed Virgin, with the midwife sitting expectant; the Child is not yet in evidence.

IV. Spain was finally reached by the Moslem invaders in two parties centering roughly around Cordova and around Seville.²⁷ The Moslem rule in Spain has, until recently, been treated from the North, and thus the fundamental differences between the two parties have been overlooked. The Seville section was that of the Arabs from Yemen, who evidently brought many Christians, Sabaeans and Copts. These found congenial fellows among the Spanish Christians around Seville (who apparently had long been under Egyptian influence), and these branches of Christians seem to have assimilated, and to have (under the name of Mozarabs) acquiesced in, and flourished under, the Arab rule. Thus they preserved many rites and doctrines unknown except so far as they have spread to the rest of the Latin Church. As one instance (among many available if my notes were accessible) that sundry phases here presented are not novel, we may refer to a rite still practiced in a political and ecclesiastical colony of Seville.

V. The Canary Islands were in 1344 given over by Pope Clement VI to Don Luis de la Cerda, a grandson of Alfonso I, "with the title of prince, and instructions to conquer and Christianize them."³⁰ But Don Luis did not go to the Canaries and it was not until the beginning of the fifteenth century that Franciscans from Seville began the evangelization of the Islands.³⁰ Why and how St. Francis himself was interested in the Nativity we cannot go into here,⁶ but we shall proceed at once to the latest mass on Christmas Eve in a great church at Teneriffe, mentioned by a medical scientist²⁷ and more fully described by him in a work²⁸ crowned by the French Academy, of which the following excerpt is a literal translation: "Suffice it to say that in one of the principal churches of the island (Teneriffe) on Christmas Day a richly adorned Virgin of wood is placed on the altar. At midnight a priest approaches, opens two doors hinged into the abdomen of the statue, and then, to the great joy of those present, takes out a beautiful pink babe." This rite, now perhaps unique within the Roman obedience, seems to have survived purely because it was on remote islands and thus overlooked in the unifying influence of Roman rule. We shall see that it appears formerly to have been widespread and, at any rate, it fits in with a rite still practiced in the Cathedral city, to wit:

VI. Seville's "Misa del Gallo" has outlived much opposition and excites the wonder of Catholic visitors. Immediately upon the stroke of midnight, as if continuing the action of the Teneriffe rite, the officiating priest takes from the altar an image of the Holy Babe, and sits with it on his knee.³¹ This is the identical attitude of Isis with her babe Horus.²⁶

VII. Teneriffe's rite may explain what has long been a puzzle to medical antiquarians and others, to wit: the "*vierges ouvrantes*"^{31, 2, 3, 10} found in many of the older churches in parts of

France where formerly the cult of Isis was prevalent. These images of the Virgin have hinged doors in the abdomen, which, when opened, disclose within an image of the Child, or even of the Trinity.¹⁷ These are so repugnant to the present feeling of the Church that they generally are opened reluctantly—or even this is made impossible by iron bands rivetted by episcopal order. That the cult of Isis was deeply rooted in Gaul during the early part of our era has been a commonplace of history for years, and has lately received some astonishing support.^{18, 20, 21}

VIII. One therefore cannot be surprised at this possible resolution of the age-long riddle left us by Firmicus Maternus (about 350 A.D.), viz.: "In the sacred rites of Isis a log is cut from a pine tree. The central portion of this log is carefully excavated, and within it is buried an image of Osiris made of seeds."^{12, 33} Thus we are brought back to the foot of the statue of Isis, and the fit symbol of the serpent with its tail in its mouth.

POSTSCRIPT

The above is but a fragment of what I had in mind when glaucoma overtook me. Remembering but little of my material (which was in notes then before me), I have been forced to rely on what remains from that little. At the outset of my blindness I made a grim joke (later corroborated by curious coincidences), to wit: "I have tried to lift the veil of Isis, but she has forestalled me by casting her veil over me." Accordingly, I must offer the above chain with most of its beads lost and those remaining much dimmed.

REFERENCES

- (1) *Bouchacourt, L.*: 1905, *Annales de la Société Obstétricale de France*, xi, pp. 191-220: "Recherches sur la Grossesse dans l'Art", several pp. at end. (2) 1906, *Chronique Médicale*, xiii, 341. (3) *Ibid.*, 1908, xv, 26. (4) *Dictionnaire d'Archéologie Chrétienne et de Liturgie*, 1907, Part II, col. 244. (5) *Ela, A.*: March, 1920, *Urologic and Cutaneous Review*, xxiv, 141-147: "Anaphrodisia in History, Folk-lore and Religion." (6) *Ibid.*, Sections xxxix, xliii. (7) *Ela, A.*: April, 1922, *AMERICAN JOURNAL OF OBSTETRICS AND GYNECOLOGY*, iii, 445-448: "Fear of the Fetus: an Ancient Cause for the Cæsarian Section." (8) *Ela, A.*: (MS in preparation): "A Hidden Cause for the Reformation." (9) *Ela, A.*: (MS nearly ready): "Obstetrical Keys to Theological Locks." (10) *Ela, A.*: (MS nearly ready): "Pre-natal Jesus in the Arts." (11) *Ela, A.* (Read March 17, 1922, before the Boston Medical History Club): "Protracted Pregnancies." (12) Firmicus Maternus, "De Erroribus Profanarum Religionum, xxvii, 1: "Isiacis Sacris de Pineæ Arbore Caeditur Truncus. Hujus Trunci Media Pars Subtiliter Excavatur, Illic de Seminibus Factum Idolom Osiridis Sepelitur." (13) *Greenfell and Hunt*: *The Oxyrhynchus Papyri*, Part xi, 190. (14) *Harris, J. R., et al.*: *Odes . . . of Solomon* (esp. Ode xix), 3d edition, ii, 1920, 298-312 *et passim*. (15) *Harris, J. R.*: 1920-1921, *Expository Times*, xxxii, 373-376. (16) *Hirn, Y.*: *Sacred Shrine*, 321 *et seq.*, and notes at p. 528. (17) *Ibid.*, at 528, n. 7. (18) Neuschotz de Jassy: *Le Cantique des Cantiques et C Mythe d'Osiris-Hetep*. (19) *Revue de l'Histoire des Religions*, 1921, lxxiii, 175-176. (20) *Revue de Philologie*, etc., 1916, 55-108. (21) *Revue Egyptologique*, 1919, N.S., i, 93-100. (22) *Sayce, A. H.*: September, 1920, *Folk-Lore*, xxxi, 173-203: "Cairene and Upper Egyptian Folk-Lore." (23) *Ibid.*, 177: "The fellah may call himself a Christian or a Mohammedan, but at heart he remains a worshipper of Isis and Osiris, or rather of the local deities who were disguised under those names." (24) *Schroeder, T.*: November, 1920, *New York Medical Journal*, exii, 851, 852: "Christian Science and Sex." (25) *Snijder, G. A. S.*: *De Forma Matris cum Infante Sedentis apud Antiquos*, 1920, *passim*. (26) *Ibid.*, works cited in footnote to p. 66. (27) *Verneau, R.* in: 1905, *Annales de la Société Obstétricale de France*, xi, 191-220: "Recherches sur la Grossesse dans l'Art", 219, 220. (28) *Verneau, R.*: *Cinq Années de Séjour aux Iles Canaries*,

1891, p. 313: "Il me suffira de dire que, dans une des principales églises de l'île, (Ténériffe), le jour de Noël, on place sur un autel une Vierge de bois, richement parée. A minuit, un prêtre s'approche, ouvre deux portes ménagées dans le ventre de la statue et en retire, à la grande joie des assistants, un joli bébé rose." (29) *Whishaw, B. and E.*: Arabic Spain, 1912, *passim*. (30) *Whishaw, Mrs. B.*: My Spanish Year, 1914, pp. 213, 214. (31) *Ibid*, 178-182, esp. 181-182. (32) In this place I can only suggest that our accepted Hebrew text is the result of severe excisions by generations of ancient Hebrew editors, and that this text has in turn been much mollified in our English translation. (33) What is here meant by "pine", "Osiris" and "seeds" we need not here discuss.

Selected Abstracts

Infection of Internal Genitalia

Salomon and Rath: The Origin of the Genital Flora. Part I. The Origin of the Intestinal Bacteria. *Zeitschrift für Geburtshilfe und Gynäkologie*, 1922, lxxv, 141.

As a preliminary to the study of leucorrhea, the authors determined first to make a study of the origin of the normal vaginal flora in the newborn child. They, therefore, studied simultaneously the first invaders of the vulva, vagina, mouth, rectum and skin, as well as the bacterial content of the birth tract of the mother and of her breasts during labor and the puerperium. In the larger proportion of cases, contents and wall of the rectum were sterile at birth, yet organisms invariably appeared within a few hours, far too soon for a descending invasion from the mouth. Cases delivered by cesarean section showed a later invasion than those delivered by the natural passages, while cases long in labor with ruptured membranes often showed earlier invasion. Of great influence upon the rectal flora were the passage of fecal material by the mother during labor, the bacterial content of the mother's vagina, the clothing and the bath of the newborn, the hands of the attendants, the air and the contents of the room. The regularity with which the first organisms appeared was of importance not for the intestinal flora alone, but also for the vaginal flora, as the authors showed in later papers.

MARGARET SCHULZE.

Salomon, R.: The Origin of the Genital Flora. Part 2. The Origin of the Mouth Organisms. *Zeitschrift für Geburtshilfe und Gynäkologie*, 1922, lxxv, 306.

The origin of the flora of the child's mouth is in great degree dependent upon the flora of the mother's vagina, upon the organisms on the mother's breasts, in lesser degree upon the bath water, the hands of attendants and of the mother, the clothing, rubber nipples, etc., and finally upon the surrounding air.

Of great importance for the mouth vegetation is the nature and length of the labor, the time of rupture of the membranes, the number of internal examinations, operative interventions, the nature of the puerperium, as well as the state of health of the child.

In the first twenty-four hours, twelve different microorganisms could be cultivated; in the first ten days, twenty-one varieties. The gram positive cocci (micrococci, streptococci, staphylococci and gram positive diplococci) predominate, particularly in the first few days over the gram positive rods (vaginal bacilli and the like). In the following days, the latter increase in number, but never reach the

numbers of the gram positive coccil forms. The relations are here, therefore, just the reverse of those in the rectum. The bacterium coli is not, as is generally accepted, a rare mouth organism in the newborn. Streptococci and staphylococci show all the characteristics of virulence without giving rise to clinical manifestations. Their hemolytic properties are of no significance.

Since the possibilities of an invasion with organisms and infection of the mouth and gastrointestinal tract are so great, the problem of a rational care of the newborn is that of keeping away all possible pathogenic organisms, and thus limiting the bacterial invasion to those which are known to be harmless.

MARGARET SCHULZE.

Salomon, R.: The Origin of the Genital Flora. Part 3. The Origin of the Vulvar Organisms. *Zeitschrift für Geburtshilfe und Gynäkologie*, 1923, lxxv, 554.

In most cases, the vulvae of children were found to be free of organisms immediately after birth, but after from five to seven or eight hours, the first organisms appeared to increase progressively in numbers. After ten hours, 28 per cent of all vulvae (compared to 57 per cent of rectum or mouth) were inhabited by organisms, after twenty-four hours 79 per cent of the vulvae as compared with 89 per cent of the rectum, and 95 per cent of the mouth. After the second day, organisms were to be found on all.

In the first twenty-four hours, fourteen; in the course of the next ten days, twenty-three different organisms could be identified. The vulvar flora shows no such constancy as the rectal flora. After the third day, rods and cocci were found in about equal numbers. The type of vulvar organisms is dependent on many circumstances. The bath is of less importance than is generally considered. Children delivered by cesarean section show vulvar organisms later than those delivered by the natural passages, and they differ quantitatively and qualitatively from the latter. On the second day, there appears a "transitional catarrh" of the vulva depending upon bacterial invasion, such as has been described for the rectum.

The type of vulvar bacteria depends upon the rectal and mouth flora of the child, the vaginal organisms of the mother during labor, the type of labor (breech presentations, etc.), operative interference, the time of rupture of the membranes, the number of internal examinations, the condition of the mother during pregnancy, and in the puerperium, the time the child is first put to breast and its condition, as well as the asepsis in its care. A knowledge of the vulvar flora is important for an understanding of the vaginal types, since no organism can be found in the vagina which has not passed the vulva.

MARGARET SCHULZE.

Sternberg: A Contribution to the Nature of the Saprophytes of the Female Genital Canal. *Zeitschrift für Geburtshilfe und Gynäkologie*, 1921, lxxiv, 447.

The author's experiments were conducted upon nonpregnant gynecologic patients who did not have leucorrhea or any inflammatory lesion of the lower genital tract. Agglutination tests with the patient's serum were made against the streptococci or staphylococci which were first isolated in pure culture from the patient's secretions. A high agglutination titre was accepted as evidence of potential pathogenicity of an organism, as the body does not develop agglutinins against saprophytes. It was found that vaginal organisms which were not giving rise to clinical symptoms nevertheless might have virulent characteristics, since they formed agglutinins in high titre. In most cases the streptococci developed more antibodies than the staphylococci. It was found incidentally that hemolytic

properties are no indication of the virulence or lack of virulence of a streptococcus. It has long been known that the vagina is self disinfecting. It soon rids itself of foreign bacteria. This ability has been ascribed in part to the acid reaction of the vaginal secretion, in part to leucocytic action, and in part to overgrowth of the foreign organism by the normal vagina flora. The author believes that this self-disinfecting power is of little value in keeping streptococci and staphylococci harmless, but that this is done rather by the general resistance of the body. For instance, as a result of the reduction of the general bodily resistance by an operation for cervical carcinoma, seemingly harmless streptococci frequently lead to peritonitis and death. The author believes, therefore, that the term saprophyte for these vaginal organisms is misleading, since they live harmless as saprophytes only so long as the general bodily resistance balances them, and may quickly become parasites if any factor lowers the protective powers of the organism and these are not developed, or are developed insufficiently or too slowly.

MARGARET SCHULZE.

Bigler, W.: The Origin and Treatment of Vaginal Discharge. Schweizerische Medizinische Wochenschrift, 1922, lii, 1193.

The usual vaginal discharge is caused by specific and infectious organisms such as: gonorrheal, septic, tuberculous, diphtheritic. Tumor growth or other disturbances of the inner genitalia, even pregnancy may also cause a discharge. Beside these causes the discharge may be from a nonspecific cause or from other flora not commonly encountered in the vagina. There are three main classes: the vaginal bacillus of Döderlein with a few leucocytes, lymphocytes and squamous epithelium in the discharge; the second type a gram positive diplococcus and vaginal staphylococcus causing a whitish acid discharge; and the third type, a gram positive or negative coccus in short or long chains, sometimes of tetragenous form, different type of sarcinae, pseudodiphtheria and saccharomyces, fusiform bacilli and even trichonematous type. The discharge is of yellowish color and may be either acid or alkaline.

The treatment consists in attempting to discover the underlying cause; if it be constitutional, treatment from that standpoint. Some vaginal discharges are due to psychic or neurotic disturbances. Local treatment in the way of douches and tampons may bring about a relief, but long continued treatment of this sort is unsatisfactory.

A. C. WILLIAMSON.

Curtis: Bacteriology and Pathology of Fallopian Tubes Removed at Operation. Surgery, Gynecology and Obstetrics, 1921, xxxiii, 621.

Curtis subjected fallopian tubes removed from three hundred patients to a careful and systematic study. Not only were the tubes examined histologically, but, in one hundred and ninety-two of the cases, all material not needed for sectioning was ground up and incubated with suitable culture media. Growths were obtained in thirty-eight cases; of these thirty-three showed macroscopic, and the other five showed microscopic evidence of active inflammation. In nineteen cases the gonococcus was grown, in nine, various forms of streptococci; the colon bacillus was found three times, the bacillus proteus once; three showed mixed growth.

From the clinical history, examination of the external genitalia, and evidence obtained at operation, together with laboratory findings, it was determined that the gonococcus was the offender in 70 per cent of the cases. In a further 10 per cent the gonococcus was thought to have been the primary cause. In about 15 per cent, the tubal pathology was thought to have been caused by the pus-producing bac-

teria. Localized tuberculosis was found in 5 per cent of the cases. It was not possible to obtain growths of gonococcus in any case which had been free from fever and leucocytosis for more than ten days or two weeks. Streptococci, however, were found years after the acute process had subsided.

Gonococcal infection was usually localized in the tube, while other bacteria, which do not have the same tendency to occlude the fimbria, spread to neighboring tissues, but produced less damage within the tubal mucosa. From the material at hand, Curtis concludes that a single attack of gonorrheal salpingitis is borne without protracted clinical symptoms or severe permanent damage, and that grossly thickened tubes are usually the result of repeated infections, either from without or from the lower genital tract. He also found that the adhesions from gonococcal infection are not as firm as those produced by other bacteria.

Since hemorrhage sometimes occurs in thickened gonorrheal tubes, the diagnosis of tubal gestation should be made with caution. Unless carefully looked for, tuberculous salpingitis is easily overlooked. Since tubes infected with gonococci are usually sterile, their removal is not so prone to produce postoperative infection of the ovaries. Tuberculous or septic tubes of like severity, therefore, would call for more radical interference.

R. E. WOBUS.

Curtis, A. H.: Problems Concerning Infections of Cervix, Body of Uterus, and Fallopian Tubes. *Journal of the American Medical Association*, 1923, lxxx, 161.

From a thorough study of one hundred and eighteen uteri, Curtis is able to show that a chronic infection of the endometrium rarely exists, therefore, the uselessness of the curette. He gives two sources of chronic leucorrhea: (1) the urethra, and its surrounding ducts and glands; (2) the cervix. He treats the cervix with radium, and has produced a complete recovery in ninety out of one hundred and four patients. An investigation of diseased fallopian tubes in a series of three hundred cases showed tuberculosis in 5 per cent, streptococcal infection in 10 per cent, and the gonococcus probably responsible for the remainder. In no case was he able to culture the gonococcus in the tubes two weeks after subsidence of fever and leucocytosis.

W. KERWIN.

Burns: Chronic Endocervicitis and Its Treatment. *Journal of Obstetrics and Gynaecology of the British Empire*, 1922, xxix, 619.

Chronic endocervicitis should be considered as a distinct pathological entity entirely apart from endometritis. Discomforting vaginal discharges are usually due to cervical infection. Cultural examination of chronic infected cervixes revealed the staphylococcus albus, alone or with other organisms, in 68 per cent, the gonococcus in less than 4 per cent of cases. The entire gland structure is infected in each case. Ionization affords a method of applying treatment throughout the infected area. The author obtained good results by this method except where erosion coexisted. Displacements of the uterus and intrapelvic complications, such as inflammation of the tubes, contraindicate ionization. Removal of the lower two-thirds of the cervical canal is advocated for all cases of chronic endocervicitis accompanied by erosion.

H. W. SHUTTER.

Hobbs, Remington: Acute Infections of the Endometrium. *British Medical Journal*, July 9, 1921, p. 35.

The author advocates careful but active treatment of endometrial infections of whatever character. In cases with gonococcal infection the following points must be carefully observed: All acute cases must be operated on immediately;

the structures below the cervix must be carefully cleaned and made aseptic from below upwards; no attempt should be made to catch hold of, or pull on, the cervix with a volsellum, nor to dilate the cervical canal; and finally, the uterus should be rid of any residual fluid after syringing, and a tube left in for drainage. The author reports several illustrative cases.

For cases of puerperal sepsis he believes in intrauterine treatment with drainage of the uterine cavity. He reports illustrative cases. Conclusions are as follows: (1) Careful treatment of the endometrium with drainage of the uterine cavity lessens the tendency to extension of the inflammation. (2) The uterine cavity may be treated time after time with beneficial effect. (3) Inflammatory conditions of the adnexa are favorably influenced by appropriate treatment of the endometrium. (4) Pain originates very frequently more from inflammation of the uterus than from that of the adnexa. (5) Operations for lesions outside the uterus except those of the grossest character are not indicated until the endometrium has been carefully treated.

F. L. ADAIR.

Stajano, C.: Diaphragmatic Reaction in Genital Infection. *Gynécologie et Obstétrique*, 1922, vi, 44.

Upper abdominal pain is not infrequent in acute pelvic diseases. One should not conclude from upper abdominal symptoms that the lesion is necessarily located in that vicinity. He thinks the diaphragmatic reaction may appear in the following conditions: gonorrheal pelvic peritonitis; menstrual congestion associated with gonorrheal infection; in the early postoperative hours, following liberation of numerous adhesions, especially of acute pelvic adhesions; pelvic lymphangitis; more often in gonorrheal pelvic infections than in pelvic tuberculosis; during the course of peritoneal exudations, but one does not see the reaction in chronic salpingitis, even in the presence of marked lesions.

F. L. ADAIR.

Forgue: The Question of Ascending Tuberculous Infection of the Female Genital Tract. *Paris Médicale*, 1922, xii, 506.

While tuberculous infection of the female genital tract usually occurs by way of the blood stream, or by continuity from the peritoneal cavity, Forgue believes that ascending infection does occur at times. In animals it has been found difficult to produce such infection by way of the blood stream, while comparatively easy by introducing tubercle bacilli into the vagina.

Keogh has shown that tuberculous endometritis is not as rare as is generally supposed, and frequently exists without coexisting infection of the tubes. Forgue believes that, even when the entire genital tract is involved, if the lesions are more advanced in the lower portions, we may assume that the infection ascended from the vagina. He thinks that the infection may ascend by continuity or may even be carried upward by the spermatozoa.

R. E. WOBUS.

Linzenmeier: The Rapidity of Sedimentation of Suspended Red Blood Corpuscles as an Aid in Differential Diagnosis in Diseases of the Adnexa. *Zentralblatt für Gynäkologie*, 1922, xlv, 535.

Linzenmeier refers to a former article in the above journal, No. 10, 1921, in which he had pointed out the importance of the sedimentation test in the diagnosis of 30 cases of acute or exacerbated infections of the genitalia. Since then Geppert (*Berl. klin. Wehnschr.*, 1921, p. 226), has also discussed this aid in diagnosis of purulent infectious processes, and believes that when the sedimentation

is slow, it is possible to rule out with great certainty acute and subacute processes. Similar satisfaction has been noted by Löhr who states that all inflammations of whatever nature give a sedimentation which is proportional to the severity of the infection, and the extent of the inflammatory processes. He believes that the reaction is of great importance in differentiating inflammatory and noninflammatory bone and joint diseases. Westergreen (*Acta. Med. Scand.*, 1920, liv), claims that the sedimentation reaction is a much more exact measure than temperature after inoculation with tuberculin. "Sedimentation" is a general reaction like fever. If then the corpuscles sink quickly it is not positively certain that the influence is from any localized area, but slow precipitation, on the other hand, allows the elimination of purulent processes anywhere in the body. When done with care, and associated with careful observation of the body as a whole, much information is obtained, particularly in genital inflammatory conditions.

The technic of the test is simple and is described in detail in this article. The method has been used in extruterine pregnancy and pelvic inflammatory disease in general, and according to Linzenmeier, sedimentation did not occur in less than 40 minutes in any case of extruterine pregnancy save where there had been an acute intraabdominal bleeding. Here the results were similar to those in acute inflammatory processes. The differential diagnosis between acute peritonitis and severe intraabdominal bleeding is best effected by the estimation of hemoglobin.

With special reference to diseases of the adnexa Linzenmeier brings evidence that in general the slower the sedimentation the better the prognosis for operation.

(a) Where sedimentation occurs in 30 minutes or less it is possible to make a practically certain diagnosis of inflammation rather than extruterine pregnancy, save in the cases of sudden and acute abdominal bleeding; and (b) in chronic cases the slower the sedimentation the greater the probability of tubal pregnancy. When the sedimentation time is less than an hour, virulent organisms may still be present and operation should, if possible, be postponed, but where it is over two hours laparotomy may be undertaken without fear of latent infection.

LITTLE.

Dalché: Noninflammatory Adnexal Disease. *Le Progrès Médical*, July 30, 1921, p. 359.

Dalché differentiates between a true inflammatory and a purely congestive condition of the adnexa. In this latter condition the most important etiologic factors are exposure to cold and traumatism, especially if occurring coincident with the menstrual period. Sexual excitement, fatigue, hepatic pathology, or enteric disorders may also cause tubal congestion. In these conditions, the pain is of a paroxysmal nature and often far out of proportion to the apparent pathology. A slight but persistent fever may be present. There is little or no peritoneal involvement and the tubal mass which may sometimes reach the size of a fetal head, is freely movable and separate from the uterus. Menstrual disturbances are a common complication.

Under appropriate treatment the condition may clear up entirely, or, on the other hand, such sequelae as prolapsed ovary, hydrosalpinx, hematosalpinx, or tuboovarian cyst may follow. The treatment advocated by Dalché consists in absolute rest in bed, mild catharsis, small hot or tepid douches under low pressure, hot wet applications to the lower abdomen, and hot baths. Cupping of the anterior abdominal wall may be of value, though it should not be practiced if there is a chance of a laparotomy being necessary. Antipyrine, potassium bro-

mide and laudanum are given as required to relieve pain. During convalescence the patient should be instructed to avoid constipation, and exposure to cold or fatigue.

THEODORE W. ADAMS.

Burgess, A. H.: *The Diagnosis of Acute Abdominal Crises.* British Medical Journal, 1920, No. 3128, p. 877.

The author divides symptoms into general and local. General symptoms include: Shock or collapse, changes in pulse, alterations in temperature, respiration changes, and miscellaneous symptoms such as a dry tongue, hicough, strangury, and tenesmus. Local symptoms are divided as follows: (1) Abdominal pain. In the early stages this is reflex and not localized to the site of the trouble; later, as a result of the irritation of the parietal peritoneum, the localization is of considerable value. (2) Cutaneous hyperalgesia. These areas have been worked out and described by Mr. David Ligat whose diagrams are reproduced. (3) Localized tenderness is always of value. Localized pressure tenderness arises from either cutaneous hyperalgesia or localized parietal peritoneal irritation. The general abdominal tenderness is of no specific importance unless associated with muscular rigidity. (4) Vomiting when early is a reflex phenomenon, but when recurrent or persistent is always a serious sign. (5) Muscular rigidity. Differentiation of involuntary from voluntary muscular rigidity is important; muscular rigidity due to defective respiratory mobility should be eliminated. (6) Meteorism localized is not necessarily serious. A steadily progressive distension is ominous. (7) Free gas in peritoneal cavity. Positive loss of liver dullness is of great importance. (8) Free fluid in peritoneal cavity. (9) Presence of definite abdominal or pelvic swelling. (10) Rectal examination is very important.

Two fallacies of importance must be kept in mind: The crises of *tabes dorsalis*, and the apparent abdominal crises resulting from intrathoracic disease. The author groups his cases into (1) the colics, (2) perforations, (3) hemorrhages, (4) inflammations, and (5) obstructions.

F. L. ADAIR.

Wilson: *Pelvic Inflammation.* Medical Journal of South Africa, 1922, xvii, 112.

Pelvic inflammations are classified as follows: (1) puerperal pelvic cellulitis, and (2) pelvic peritonitis, puerperal and nonpuerperal. Pelvic inflammations cannot be classified according to the infecting organisms. Bacteriologically the infections are autogenous in a considerable percentage of cases. Pelvic cellulitis is almost entirely of puerperal origin. The induration begins at the bases of the broad ligaments near the cervix and extends outward along the planes of radiating fibromuscular bands. If the veins are invaded, thrombophlebitis results. Thirty to fifty per cent of the deaths from puerperal sepsis are due to septic thrombophlebitis.

The portal of entry in puerperal pelvic peritonitis is usually at the placental site. Pyosalpingitis is rare after full term delivery while pyosalpingoophoritis is the rule in infections following abortion. The usual lesion in puerperal peritonitis is an abscess of the broad ligament with involvement of the ovary. In sepsis, conveyed along the veins and lymphatics draining the placental site, the appearance of symptoms is delayed.

The vast majority of nonpuerperal pelvic infections are of gonorrheal origin. Complement fixation is of little diagnostic aid in these cases. Surgery is not the treatment for acute gonorrheal peritonitis.

Pelvic cellulitis following labor usually accompanies lesions of the cervix and is in a large percentage of cases preventable at the time of labor. Glycerine

gauze packing and the antiseptic methods developed by the war are frequently of value as measures of treatment. If pus forms, drain. Pus cavities after drainage can be irrigated with antiseptic solutions. When sepsis has occurred from an infection at the placental site the organisms are already past the reach of the curette. In postpartum pyosalpinx, operation should be early before physical depletion and dense adhesions occur. The author still eurettes for postabortal sepsis. In pronounced sepsis following abortion in which conservative treatment is of no avail, hysterectomy and salpingoophorectomy are done at the end of two weeks. He has never ligated the veins in septic thrombophlebitis without removal of the uterus. In the chronic stages of peritonitis-salpingoophoritis, conservatism is the rule. If the tubes have become mere pus sacs they must be removed.

H. W. SHUTTER.

Nürnberg: Clinical Features and Pathologic Physiology of Conservative Operations upon the Adnexa. *Zeitschrift für Geburtshilfe und Gynäkologie*, 1922, lxxxiv, 606.

The author reviews the results in 194 patients operated upon for inflammatory disease of the adnexa in 10 years. Posterior colpotomy was the operation in 42 cases, unilateral salpingoophorectomy in 35 cases, bilateral salpingectomy with or without retention of the ovary in 31 cases, defundation in 5 cases, supravaginal amputation in 5 cases and panhysterectomy in 18 cases. Seventy-nine of these cases were followed and reexamined. Six more were heard from by letter. The mortality of the 161 conservative operations was 2.9 per cent; of the 23 hysterectomies, no mortalities.

From a study of this material, the author presents the following conclusions. In all cases of inflammatory adnexal tumors, a systematic conservative treatment is first of all to be instituted. If larger Douglas abscesses develop, these should be emptied and drained. Where the abscess cavities are situated laterally, so that in colpotomy the danger of accidental injuries would be too great, incision and drainage should be undertaken only exceptionally and under special indications (high fever with progressive cachexia, threatening perforation, etc.). If long continued conservative treatment is not successful, laparotomy should be carried out. Only when there is isolated unilateral adnexal disease should one be content with removal of one side. Two-thirds of the cases of unilateral salpingoophorectomy showed a continuation of symptoms. In bilateral pyosalpinx, one may expect results only from radical operation. In young women in whom one wishes to retain the menstrual function, the operation of choice is a defundation with bilateral salpingectomy with the retention of some functioning ovarian tissue. In all other cases, total extirpation should be done. The appendix should always be examined and if diseased should be removed. MARGARET SCHULZE.

Scheid, F.: Adnexal Disease in Childhood and its Significance in the Differential Diagnosis of Appendicitis. *Medizinische Klinik*, 1922, xviii, 1277.

During the last three years, among 150 women in whom a diagnosis of appendicitis had been made, 30 were found to have salpingitis. The author believes that this proportion is smaller than is usually encountered. He gives the histories of three young girls, 15, 13 and 13 years old respectively, in whom a diagnosis of appendicitis had been made, but in whom pelvic disturbances were found, which caused the symptoms demanding operation. In two of the patients the hymen had been intact and menstruation had not occurred. In two cases gonorrheal salpingitis was found, while in the third there was a 360 degrees torsion of

the right tube and ovary. From the occurrence of these three cases in a relatively short period of time, the author believes that adnexal disease in children is not uncommon. If at operation the appendix appears normal, the adnexa should be examined. The diagnosis is difficult. When in doubt, an exploratory laparotomy will do little harm and will be less dangerous than neglecting an appendicitis.

J. P. GREENHILL.

Benthin, W.: *Obstetrical and Gynecological Free Peritonitis.* *Monatsschrift für Geburtshilfe und Gynäkologie*, 1922, lx, 171.

A critical review of the literature on the use of ether for free peritonitis is presented. In addition, Benthin gives his own results. Of his 71 cases of peritonitis, 47 were obstetrical. Most of the latter were due to abortion, especially of criminal origin. The majority of the gynecological cases occurred after operation. The general mortality for the 71 cases was 50.5 per cent; but omitting those patients (22) who had general sepsis, the percentage of cures was as follows: Of the 49 remaining patients, 71 per cent; the gynecologic cases 63 per cent; those with peritonitis occurring after labor 85.7 per cent; and those with peritonitis after abortion 73.8 per cent.

The author advises that an early diagnosis be made by means of abdominal puncture which is without danger. Operation should be performed even when the diagnosis is only a suspicion. The operation should be limited essentially to incision and drainage, without irrigation or mechanical removal of pus, and without release of adhesions. Before closing the peritoneal cavity, 200 gm. of ether are injected. Of great importance is the aftercare which should include regulation of the fluid intake, and care of the heart and bowels.

J. P. GREENHILL.

Benthin, W.: *Is it Possible to Improve the Prognosis of Obstetrical and Gynecological Peritonitis?* *Medizinische Klinik*, 1922, xviii, 1453.

The prognosis for peritonitis of obstetric and gynecologic origin is much less favorable than it is for surgical peritonitis (70 to 80 per cent mortality against 30 to 40 per cent). The author believes however that it is possible to lessen the mortality in the former group by an early diagnosis with abdominal puncture. If leucocytic exudate is found, operation is done immediately under lumbar anesthesia. Before closing 200 c.c. of ether are poured into the peritoneal cavity and one quart of salt solution containing adrenalin is given subcutaneously immediately after operation, also camphor, caffeine and digalen.

Also in doubtful cases operation should be performed, but should be as conservative as possible. The adnexa should not be removed, and the uterus only in case of perforation, laceration and hemorrhage. Prophylactic enterostomy need not be done, for lumbar anesthesia and ether have a very beneficial effect on the paralyzed intestines. A general anesthetic should be avoided. Morphia may be used freely during the convalescence.

J. P. GREENHILL.

Adami: *Fulminant Menstrual Peritonitis.* *Journal of Obstetrics and Gynaecology of the British Empire*, 1922, xxix, 104.

The author gives the history and autopsy findings in a case of septic peritonitis occurring in a menstruating 14 year old girl. Less than 24 hours before, while menstruating she had taken part in a gymnasium contest. Death followed a toxic, comatose condition of but a few hours' duration. Autopsy revealed free fluid in the peritoneal cavity and a moderate congestion, most pronounced in the pelvis.

The uterus contained a small amount of sanguinous fluid, the cervix was open and contained no mucous plug. The examination of all other organs was negative. A pure culture of streptococcus was obtained from the free peritoneal fluid. So sudden and profound had been the attack that no leucocytic reaction occurred.

Adami concludes that the negative intraabdominal pressure produced repeatedly while swinging on gymnasium rings had aspirated vaginal contents, through the open cervix into the abdominal cavity. A somewhat similar phenomenon may account for some of the idiopathic puerperal infections seen in practice.

H. W. SHUTTER.

Block, F. B., and Mikelberg, H. M.: The Nonoperative Treatment of Pelvic Inflammatory Disease. *Pennsylvania Medical Journal*, 1922, xxvi, 15.

One hundred and twenty cases of chronic inflammatory pelvic disease received nonoperative treatment, consisting in hot douches at home, local treatment of cervical infections, application of antiphlogistic solutions, and in some cases administration of organic glandular preparations. Of 91 patients with gross pathology, 19 were much improved, 49 showed only moderate improvement, a total of 68 (or 74.6 per cent) showing improvement. The remaining 23 patients (25.4 per cent) were unimproved, and 5 of these were referred for operation. Of the 29 patients without gross pathology, 8 were much improved, 12 moderately improved, a total of 20 (68.9 per cent) showing improvement; while the remaining 9 patients (31.1 per cent) there was no improvement.

In brief, 98 cases (81.6 per cent) were treated less than four months, and were either improved sufficiently to discontinue treatment, or were advised to seek operative relief.

C. O. MALAND.

Campbell, John: Treatment of Salpingoophoritis. *British Medical Journal*, October 14, 1922, p. 683.

The author deals with the treatment under two separate headings.

(1) Acute salpingoophoritis. Irrespective of the cause, the prevailing opinion is in favor of expectant treatment during acute inflammatory condition of the tubes and ovaries. The author is of the opinion that acutely inflamed tubes should be removed as early as possible.

(2) Chronic salpingoophoritis. He divides his cases into two groups; first, the patient in whom symptoms are practically absent, the woman usually seeking advice on account of sterility; second, the patient whose general health is poor with much pain and discomfort in the pelvic region. In the first group expectant and local treatment has a place. In the second group, operation is indicated except in syphilitic cases. The author prefers the abdominal route in his operations. He feels that drainage is necessary in certain cases, preferably using strips of gauze sheathed with thin rubber.

F. L. ADIAR.

Dubose: Treatment of Acute Pelvic Infections in Women. *Surgery, Gynecology and Obstetrics*, 1921, xxxiii, 299.

Instead of awaiting developments, Dubose advises immediate operation in acute pelvic inflammation, preferably within the first twelve hours. He makes a low abdominal incision and removes all acutely infected organs as well as any pyogenic membranes present, even in cases where there is a distinct fluctuating mass in the culdesac. If seen after twelve hours, he sometimes defers operation in cases where the process seems stationary, or if a high leucocyte count demon-

strates active resistance to the infection. According to this plan, he has operated on 255 cases, including 80 hysterectomies, with one death. There were 76 double salpingectomies in addition. In the rest he removed either one tube or ovary or both.

While Dubose claims complete cure in the majority of his cases, he admits that not one subsequent pregnancy occurred in any of these patients.

R. E. WOBUS.

Werner, P.: On the Treatment of Genital and Peritoneal Tuberculosis. Wiener Klinische Wochenschrift, 1922, xxxv, 535.

Operative treatment has been used by French surgeons while conservative treatment has been advocated by the Germans (especially Amann, Martin, Veit, and Krönig.) The difficulty of making an accurate diagnosis without operation makes the statistics in regard to cure by medical methods uncertain. In making a diagnosis the past history is important. Late appearance of menstruation with dysmenorrhea is in favor of genital tuberculosis; abnormal menstruation is of little value. Fever with tumor is in favor of a positive diagnosis. Pain varies greatly in degree and situation. Palpation is not reliable, though on the whole there is less spasm with tuberculosis than with infections. The eye, skin, and tubercular tests are not certain proofs as there may be tuberculosis elsewhere in the body. The discovery of tubercle bacilli in the uterine discharge is difficult.

The author reports 14 cases of peritoneal and 23 of genital tuberculosis. The classification rests on the dominant type, both being found in most cases. Most of them were treated with x-ray after operation. Of the former 14 cases, 11 were of the ascitic form and 3 of the adhesive; all had exploratory laparotomies. Of the 23 cases of genital tuberculosis 10 had abdominal hysterectomy with the removal of both adnexa. Three had partial removal of the adnexa by laparotomy, two by vagina; one had a large abscess opened, resulting in a recto-vaginal fistula. Four had exploratory laparotomies but conditions were so bad that nothing was removed. One was explored by the vaginal route but such dense adhesions were found that nothing was done.

In the 37 cases he had two operative deaths, 5.4 per cent. There were three fistulae, 8 per cent (two of them in one patient). The end results were hard to verify because of difficulty in following the patients, but over 50 per cent were cured.

X-ray treatment is giving good results with weak dosage so that amenorrhea and sterility do not have to occur.

FRANK A. PEMBERTON.

Jaegerroos: Hydrosalpinx. Archiv. für Gynäkologie, 1921, xiv, 328.

Jaegerroos offers an exhaustive clinical and histologic study of hydrosalpinx, based on 100 cases operated upon, 6 in Schauta's clinic and 94 in Engstrom's. The chemistry of the fluid in 11 cases studied, and the histology of the tubes in the 58 cases studied convince the writer that the hydrosalpinx begins as a salpingitis in which the exudate is either serous or slightly purulent, with a transudate following. Other studies of his own have convinced him that this salpingitis is limited in cause to one of three organisms: streptococcus (puerperal), tubercle bacillus, or commonly gonococcus.

The dilatation of the tube is usually in the ampulla, and the maximum size observed was that on a fetal head. Because of its bearing on operative treatment, it is worthy of mention that Opitz has explained the invariable inrolling

of the fimbriated end of the tube on the grounds that the tube, elsewhere loosely invested by peritoneum, has a snug peritoneal collar close to the abdominal ostium: an accumulation of fluid medial to this collar distends the tube and causes the fimbriated end to roll through the constriction. In favorable cases, therefore, evacuation of the fluid makes possible a restoration of the fimbriae to their normal position. A certain optimism as to restoration of function is justified by Jaegerroos' always finding the epithelium preserved, though much flattened where the tube is markedly distended. In several cases the fresh specimen showed active motion of the cilia. Based on the favorable results of salpingotomy or salpingostomy, or both, in Engstroem's clinic, Jaegerroos pleads for conservatism where it is possible. In 59 cases so treated which were followed up, there were only 5 found with swellings in the adnexa, after from 9 months to 7 years. One patient bore a living child 18 months after salpingostomy.

RAMSAY SPILLMAN.

Nash: Hemotosalpinx-Pyosalpinx with Torsion of the Right Fallopian Tube. The Lancet, 1922, cccii, 78.

This condition occurred in an unmarried girl 18 years of age. The interest in this case lies in the torsion of a tube already the seat of pyosalpinx, and in the resemblance of the symptoms to appendicitis. It illustrates the need of investigating the condition of the pelvic organs when there is insufficient evidence of disease in the appendix.

NORMAL F. MILLER.

Books Received

PHYSIOLOGIE OBSTETRICALE, NORMALE ET PATHOLOGIQUE. Par H. Vignes, Accoucheur des Hôpitaux de Paris. Préface du Professeur A. Couve-laïre. Masson et Cie, Éditeurs, Paris, 1923.

OBSTETRICS FOR NURSES. By Charles B. Reed, M.D., Obstetrician to Wesley Memorial Hospital, Chicago. Second edition, with 144 illustrations, including two color plates. C. V. Mosby Company, St. Louis, 1923.

TRAITE D'OBSTETRIQUE. Par A. Ribemont-Dessaignes et G. Lepage. Neuvième Édition, revue et mise à jour par V. Le Lorier. Avec 587 figures dans le texte. Masson et Cie, Éditeurs. Paris, 1923.

AIDS TO GYNAECOLOGY. By Richard E. Tottenham, B.A., M.D., etc. Censor and Examiner in Midwifery; Fellow of the Royal Academy of Medicine, Ireland, etc. Sixth Edition. William Wood & Company, New York, 1923.

HEREDITY AND CHILD CULTURE. By Henry Dwight Chapin, President of the Children's Welfare Federation of New York, etc. With a Foreword by Professor Henry Fairfield Osborn. E. P. Dutton & Co. New York, 1923.

BIOLOGIE UND PATHOLOGIE DES WEIBES. Ein Handbuch der Frauenheilkunde und Geburtshilfe. Herausgegeben von Josef Halban, Wien, und Ludwig Seitz, Frankfurt a.M. Lieferung 1 (III. Band, Seiten 1-464, mit 171 Abbildungen im Text). Verlag von Urban und Schwarzenberg, Berlin und Wien, 1923.

HANDBUCH DER KINDERHEILKUNDE. Ein Buch für den praktischen Arzt. Herausgegeben von Professor Dr. M. von Pfaundler und Professor Dr. A. Schlossmann. Erster Band, dritte Auflage. Verlag von F.C.W. Vogel in Leipzig, 1923.

Erratum

In Dr. Thos. R. Goethals' article in the September issue, page 329, Table IV, the last figure in the last column should read 2.56% instead of 0.64.

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Original Communications

THE RELATIONSHIP OF UTEROPLACENTAL APOPLEXY TO ABLATIO PLACENTAE*

(A CLINICAL STUDY)

BY RUDOLPH W. HOLMES, M.D., CHICAGO, ILL.

THIS study summarizes the information derived from the attendance on 21 cases of premature detachment of the normally situated placenta, and one case of uteroplacental apoplexy; includes a résumé of the impressions obtained from a study of the tabulated cases (306 in number) of Goodell (1869) and Holmes (1901); the 69 instances of toxemia apoplexy compiled by Willson; suggestive data have also been obtained from the reports of Harrar of 254 cases of ablatio treated in the New York Lying-in Hospital, and of Cragin's 212 cases managed at the Sloane Maternity. Numerous other case reports were read, making an approximate total of 900 cases of the complications under discussion.

ETIOLOGY—AN HISTORICAL REVIEW

During the past quarter of a century premature detachment of the placenta has had an increasing clinical significance—for only in this period has its etiologic, pathologic, and symptomatic characters been truly appreciated. Before Goodell wrote his monograph on "Concealed Accidental Hemorrhage of the Gravid Uterus," the complication was held to be of great rarity and its etiology was grossly misinterpreted. In the period between the publication of that paper and that issued by the writer in 1901, there was an increasing recognition

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NOTE: The Editor accepts no responsibility for the views and statements of authors as published in their "Original Communications."

with a more definite statement of the pathologic factors which produced it. Truly, the very caption of Goodell's contribution, taken from Rigby's nomenclature, led many astray, as too many writers had endeavored to adduce a relationship of the condition to some casualty, not appreciating that Rigby tried to show that the hemorrhage from this condition was adventitious, in antithesis to the *unavoidable* hemorrhage of placenta previa. It is unfortunate that some recent writers have perpetuated this erroneous impression by maintaining that the separation is incident to a violent, brutal tearing of the placenta from its site, in fact, carrying the implication of an unusual traumatic origin.

Before the modern pathologic era came into being, men like Jacquemier, Mesnard, and Cazeaux attempted to prove the separation was dependent upon purely anatomic conditions; and, in fact, the delicate line of cleavage between placenta and uterine wall undoubtedly contributes conditions favorable for premature separation. Levret and Baudeloeque considered that the short cord might be responsible for the accident in view of the fact that, in their cases, the cords were torn asunder, having been accidentally shortened. The literature has repeated reference to the traumatic origin of ablatio, and unquestionably the contention is correct in a certain few examples: in the writer's personal case reports embodied in this paper, he presents two such instances—one due to a violent blow in the abdomen, the other the result of the induction of premature labor by catheters. While traumatism has its place in the etiology we must concede that the usual accidents ascribed as a cause must be contributory to some evident or obscure serotinal change.

Under the leadership of Rokitansky a number of contributions have been presented showing evidences of material alterations of the placental structure: he believed that inflammatory changes were responsible. Kaltenbach and Veit held that all placentae must have a serotinal inflammation or degeneration to permit of a premature separation. During the past decade some writers have denied the allegations of Rokitansky and his school.

Great strides were made after Winter, in 1884, showed that cases of *ablatio placentae* not infrequently had an associated kidney lesion, expressed by the presence of albuminous urine, with secondary endometrial changes. Here, Fehling and Schröder declared we must go further before we may assume there be a difference between infarcts or inflammations accompanying an albuminuria and those where the latter does not exist. However, Bue, Weiss, Lehmann, Hennig, Rousseau-Dumareet, and a host of modern writers, corroborated Winter's pronouncement that a kidney disturbance was an etiologic factor in the production of a premature separation. Today, there is irrefutable

evidence of an associated toxemia with many instances of separation. The next great advance came when Couvelaire, in 1911, showed definite evidences of an hitherto unrecognized type—*The Apoplexie Utero-Placentaire*, though Robert Lee, in 1848, Coale, in 1859, and Hellier, in 1892, expressed the condition of accidental hemorrhage as a “placental apoplexy.” It is clearly evident that they had no conception of the pathology as described by Couvelaire. Couvelaire deserves great credit for the description of the new phase of ablatio—even that he has depicted a new disease entity; it is meritorious that he gave a vivid picture of the gross pathologic anatomy and a definiteness of the causal factor, even though, perhaps, our clinical recognition is still faulty. In turn, Williams, in 1915, and Willson, in 1922, gave invaluable contributions, and supplied the stimuli for an intensive study of the subject in this country. The picture of the uterus degenerated by Couvelaire’s toxemic apoplexy is so characteristic, the organ presenting such vivid coloring, differing from uteri not so involved, that it is truly remarkable that the 45 authors who recorded postmortem findings in the collections of Goodell and the writer, did not apperceive the peculiar appearance of the uteri inspected, if it existed, though Desmond, in 1857, described “the uterus was healthy with the exception of two or three ecchymotic spots,” and Weiss, in 1894, mentioned a similar appearance. In the light of our modern comprehension of the influence of toxemias on the body, and especially their influence on the production of premature detachment, we must admit that a considerable number of the cases of toxemic apoplexy must have appeared in the literature, and were compiled in the work of Goodell and the writer, but the necessary close macroscopic, let alone microscopic inspection is lacking, therefore, their identity is lost. Our conception of the clinical entity of toxemic apoplexy is still so indefinite that it is impossible to cull from the literature case reports which shall conform to Couvelaire’s type unless we accept one sign as characteristic—uterine rigidity—which will receive consideration later.

At the present time it may not be controverted that a toxic element is responsible for a considerable portion of the cases under discussion. How far we may go in the declaration that all premature detachments, other than a certain few traumatic instances, have an antecedent toxemic etiology is still a moot question. Until doubtful points have been elucidated, we believe there is ample evidence to justify the claim that there are at least three broad divisions of placental separation, based upon etiologic differences, even though clinically they may not invariably be separable into types from ignorance of pathognomonic differential symptomatology. These etiologic divisions may be given

as: (A) traumatic; (B) localized pathologic changes of the uteroplacental union (inflammation, infarctions, etc.); (C) systemic evidences of toxemia, with localized genital, renal and hepatic pathology. In the 22 cases presented by the writer he believes such cases may be isolated. The microscopic descriptions of uteri and placentae given by various writers show such a wide variation in detail that a typical picture for Couvelaire's apoplexy is not yet available. In one feature alone do they conform to type, namely, the minute hemorrhages between muscle fiber and fasciculi; other changes are variable. In the writer's case, both uterus and placental tissues show evidences of inflammatory as well as degenerative changes.

The most fatal toxemic disease of advanced pregnancy is eclampsia; essentially, the eclampsia incidence is three or four times more frequent in primiparae than multiparae. Primiparous labors, in relation to multiparous ones, are between one in three to one in four. Therefore eclampsia is peculiarly an affliction of the first labors. According to Goodell's statistics ablatio occurred in only 12.5 per cent of primiparous case reports; in the 200 cases collected by the writer the incidence of ablatio in primiparae was 19.2 per cent. Willson presents the fact that 18 of the 69 cases of apoplexy were in primiparae—26 per cent. Accordingly, Goodell's and the writer's figures show that ablatio is especially a disease of the multiparous woman. Willson's data, few as the cases are, tend to show that the incidence of apoplexy is the same for primiparae and multiparae. Instances of coincident development of eclampsia and ablatio are extremely rare, for in the 306 cases accumulated by Goodell and the writer there were only four cases of eclampsia recorded—cases 17 and 40, respectively reported by J. T. Ingleby and J. L. Baudelocque, in the collection of the former, and those of Hennig and Tucker in the latter's collection. The writer presents two instances of eclampsia-ablatio in his series of 22 personal cases. Therefore, in 328 instances of ablatio, eclampsia was present as a concomitant disease in 6 cases, 1.8 per cent. On the other hand, Willson shows that there were 6 instances of eclampsia in his 69 cases—8.6 per cent. From the extreme rarity of the association we are strongly inclined to the opinion that a very different toxic substance is the dominating factor in ablatio of the toxemic type, from that causing eclampsia, or the other commonly recognized toxemic states in pregnancy. It is plausible to believe that the concomitant presence of eclampsia and ablatio (or toxemic apoplexy) is a manifestation of the activity of two foreign substances arousing diverse syndromes. It has yet to be written that the hepatic changes incident to toxemic apoplexy conform to the common picture of the characteristic lesions produced by the eclamptic poison.

SYMPTOMS

We believe the infrequency of recognition of premature detachment of the placenta until the patient is in a critical state is largely due to the inexact descriptions of symptoms in textbooks and current literature; contributory to this is the accentuation of particular symptoms—for example, uterine rigidity—giving the impression to the casual observer that they are always pathognomonic symptoms, invariably present. For the past 25 years the subject has been of peculiar interest to the writer, so he has studied the question at every opportunity—as a result he has analyzed some 400 case reports; we believe this study permits a summary of the symptoms as follows, later taking up the phases seriatim:

With slight or no prodromal manifestations the woman is seized with (1) abdominal (uterine) pain; (2) nausea and emesis; (3a) systemic signs of blood loss (dizziness, faintness to loss of consciousness, colorless mucous membranes and skin, clammy perspiration, thready pulse, air hunger); (3b) uterine evidences of hemorrhage (enlargement of the uterus, diffuse, or localized as an accessory tumor, escape of blood serum as a pinkish fluid, later free blood or clots; (4) variations of uterine consistency; (5) shock; (6) violent fetal movements, then its death; (7) blood pressure.

1. *Abdominal Pain*.—The pain may be a vague discomfort, even hardly perceptible, a sensation of fullness, slight pain, to the other extreme, where there will be the most severe distress, even the most agonizing, rending, bursting pain. Other things being equal, a slow insidious accumulation of blood within the uterus will be characterized by a minimum of discomfort, while sudden distention of the uterus will carry with it great distress; intense pain is due to rapid stretching of the uterine peritoneum which may cause rupture of that serous membrane. In some instances the woman will locate the sensations within the uterus, even localizing it to an area later proven to be the placental site; again, the patient will complain of a diffuse abdominal pain or discomfort.

2. *Nausea and Emesis*.—These symptoms demand emphasis as too frequently they have misled the medical attendant into the belief that the cause of the upset is an acute gastric attack, until, often too late, the true condition is evidenced by a frank systemic or local evidence of hemorrhage. Unquestionably, these symptoms are reflex in origin, sequential to a splanchnic irritation due to the sudden anatomic changes occurring within the uterus; or they may be the result of the tearing of the uterine peritoneum as previously mentioned.

3a. *Systemic Signs of Hemorrhage*.—Here again, not infrequently, one is led to believe the dizziness, faintness, or loss of consciousness

are a reflection of a cardiac attack, or associated with the nausea and emesis, that they are evidences of gastric or intestinal colics. Later, when the acute manifestations of blood loss are appreciated by the attendant, the patient is in a precarious condition and a poor surgical risk for operative intervention. In this connection, repeated red blood counts, with determination of the hemoglobin index, will aid materially in doubtful cases. In view of the remarkable profusion of polymorphonuclear leucocytes in the uterine muscle and placenta of the writer's patient, it is suggested that white counts may be of signal value, and should be made as a routine.

3b. *Uterine Signs of Hemorrhage.*—The intelligent patient, or the observant by-stander may recognize that the uterus is enlarging, either symmetrically, or in a localized area; the increased size, naturally, only may be appreciated by the physician if he has examined the woman shortly before the occurrence of the accident. If the placental site be on the anterior wall, in part or entirely, the marked irregularity of the uterine contour is a striking picture; it may be recognized by the palpating fingers and the eye. This irregularity is due to the temporary, at least, adhesion of the placental periphery, with the accumulation of blood clots which bulge the placental site, and has been called the "accessory tumor." In the 22 cases observed by the writer this sign was present 5 times—all were in instances of relatively concealed hemorrhages. The accessory tumor was mentioned in 11 cases of Goodell's collection, 3 being in relatively concealed cases.

The retention of the effused blood is dependent upon various factors: a, the placenta is centrally detached with an adherent periphery; b, the membranes may be so firmly adherent that the blood is retained within a circumscribed area; c, the presenting part may have such a close girdle of contact that it acts as a ball valve, inhibiting the escape of blood; d, in exceptional instances the membranes may rupture (?) near the effused blood, so it accumulates within the amniotic sac; e, the cervical canal may be atresic, producing a condition comparable to hematometra of the nonpregnant; f, coagulation of the blood occurs so promptly that thrombosis and arrest of further bleeding is secured. All of these factors except "f," are dependent upon purely mechanical conditions existing within the uterine cavity; the tonicity of the uterine muscle, or its ability to respond to the stimulus of the foreign body within its cavity—the blood clot—determine the duration that the blood shall be stored up as an absolutely concealed hemorrhage. *A priori*, the amount of blood which may accumulate within the uterine cavity, is dependent upon the tonicity or absence of that tonicity of the uterine wall; other things being equal, prompt development of uterine contractions will promote an early escape of blood serum or

blood, free or clotted, while undue laxness with absence of contractility will permit prodigious amounts to collect within the uterine cavity. Chevalier described a case of a woman admitted to the hospital with an abdomen so distended that it suggested a pregnancy near term; an immediate postmortem cesarean section was performed to save the baby—the three months' fetus was found imbedded in massive clots in the enormously enlarged uterus.

Writers, almost universally, have described cases of premature detachment as of two varieties, *concealed and external hemorrhages*, as if they were entirely different forms. In no sense may we subscribe to such an opinion; the difference is merely dependent upon the mechanical factors already enumerated; further, such classification carries the implication that in the former blood is retained within the uterus, while in the latter such is not the case. This is so wide of the mark that we insisted in our first paper (1901) on this subject that a far preferable division is to give them the captions of "Absolutely Concealed and Relatively Concealed Types." We may not too strongly insist that *the absolutely concealed type is merely the precursory stage of the relatively concealed form*. The blood is absolutely concealed so long as the mechanical hindrances to its escape obtain, or the lack of uterine tonicity may not overcome such obstructions to the escape of blood. These mechanical hindrances may only restrain the blood for a very brief period, or they may continue for many hours before the dam is broken, when blood serum first will escape, followed later by free or clotted blood. These facts may not be too strongly emphasized, for too many, we believe, have assumed gross differences between the patent and concealed forms, while we believe that neither from an etiologic, pathologic, nor symptomatic viewpoint is there a particle of dissimilarity between them. Just as jaundice is a belated sign of biliary tract obstruction, so external hemorrhage in ablatio is a tardy evidence of an intrauterine blood loss. We are in entire accord with Braxton Hicks who stated: "but the proportion which that appearing externally bears to that remaining internally varies considerably"; the amount which appears externally is never a gauge of the quantity of blood the woman has lost from her circulation. To put it concisely, other than the one visible evidence, external hemorrhage, there is not one sign or symptom, or complex of them, which may not be equally prominent, or lacking in the one or the other, absolute or relative concealment. Therefore, external bleeding is merely a diagnostic sign.

The one pathognomonic sign, invariably present, in all true cases of *ablatio placentae*, whether they be absolutely concealed or relatively concealed, is the expulsion of old clots, and perhaps, old blood, with the child and placenta; a failure to appreciate this clinical phenomenon

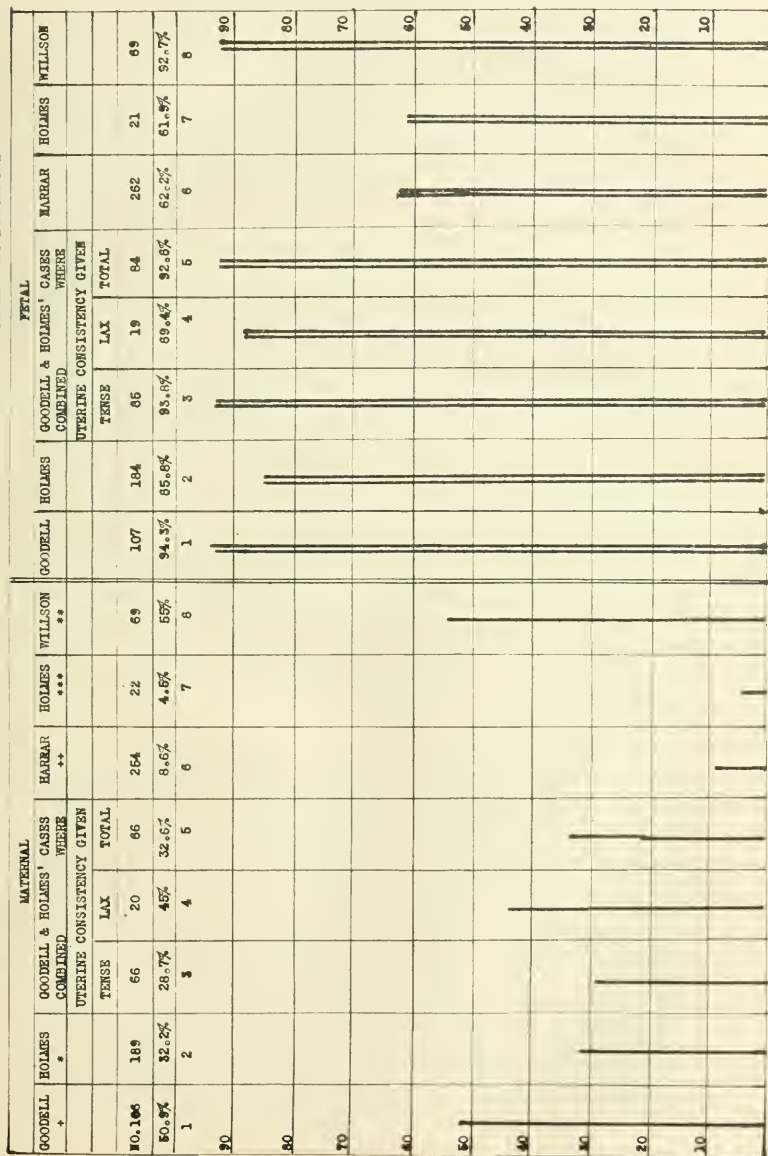
is to fail utterly in the comprehension of the conditions obtaining during the course of *all* cases of premature detachment of the normally situated placenta. The amount of this blood, clotted and free, is directly proportionate to the amount of blood pent up during the continuation of the clinical course of *absolutely* concealed types, and varies inversely as to the amount which has been extruded from the uterus before delivery in *relatively* concealed cases. Very commonly though not necessarily always, a clot will be found deeply embedded in a depression formed on the maternal surface of the placenta; this cupping of the placental surface is dependent upon the duration the clot has been arrested behind the placenta, and the degree of compression to which the clot has been subjected. Not rarely, a woman may present no signs of hemorrhage during labor, yet the placenta will contain a clot filling a depression—evidence of a mild ablatio.

4. *Uterine Consistency*.—How much the consistency of the uterus has a bearing in relation to ablatio is a moot question (omitting the toxemic variety for the moment, where it may be proven of vital diagnostic value by future observers). Before we may subscribe to the dictum that an undue hardness of the uterus characterizes all, or nearly all, cases of premature detachment, we must determine criteria from the study of the texture of the normal pregnant uterus near term. In a careful survey of all pregnant women near term whom we have examined, we find that some have such flaccid uteri that the baby is as readily palpated as if it were directly under the examining fingers. Others may permit definite information from the palpation, but with some difficulty, while a few have such tense, resisting walls that little information is derived from external examination; these same classes, during labor, in the interval of contraction, tend to have uteri which conform to the same texture as that obtaining before labor began. We must declare that just as the normal variants of uterine consistency exist, from extreme flaccidity to most intense firmness, so under the stress of ordinary ablatio the consistency of the uterus may have its variability from extreme hardness to marked laxness.

Williams, in his textbook and magazine writings, speaks of the uterine texture as of ligneous hardness, which may have been accepted as a characteristic finding. Galabin, Eden, Dakin, Berkeley and Bonney, and Cragin subscribe to this in a measure, at least. We believe that some cases may present such extreme resistance of the uterine walls that they corroborate the above dictum; but we may not concede that it is even the common finding in the majority of cases. If we inculcate the dictum that the essential diagnostic point in all cases of premature detachment is a remarkable tenseness of the uterus, we will mislead many to procrastination in the diagnosis of accidental hemorrhage, with a continuation of a needlessly high maternal and fetal mortality.

In the critical study of approximately 400 case reports of ablatio we find many observers who mention that the uterus was tense, hard, rigid, resisting; or, as a corollary, some have described the membranes as tense, bulging, etc. Others have characterized the uterine consistency as doughy, flaccid, relaxed, atonic, giving no reaction to stimuli, so that the fetus was palpable with consummate ease. In our series of 200 collected cases the consistency of the uterus was noted as tense in 38, and relaxed in 11; in Goodell's 106 cases there were 28 and 9 respectively so described; in the remaining 220 cases the uterus had no peculiarity of texture. In the writer's personal cases, 5 were described as tense, while the instance of toxemic apoplexy was as tense as a highly inflated football, ligneous hardness if you will. The uterus in one case was mentioned as boggy, and the rest, 16, had uteri which aroused no curiosity from their texture. We concede there are possibilities of error in the old statistics, for in the time before 1900, when the writer's paper was in preparation, abdominal palpation was not generally employed, and too commonly, when used, the findings were improperly interpreted. Our information is still too meager to permit any one to be dogmatic, yet, regarding the toxemic variety, with the accumulation of evidence, we may be able to declare that the intensely hard uterus may be the crux of the differentiation between ordinary ablatio and toxemic apoplexy.

In the hope that some light might be cast upon this matter we have isolated all cases from the collections of Goodell and the writer where uterine consistency was mentioned; the mortality rates for mother and baby were calculated both on a basis of tenseness and laxness of the uterus, and on patency or concealment of the hemorrhage. The graphic presentation is given in Chart 1. The figures show that, in both the relatively concealed and absolutely concealed types, the maternal mortality is materially less where there is marked tonicity than where the uterus is relaxed; the jeopardy to the baby is slightly lessened in relaxed forms in comparison to those where rigidity was noted, where there were sufficient numbers of cases given to make comparison. Further, this table shows that if the uterus be tense, according to Goodell's series, the patent forms have a somewhat lessened maternal mortality over the concealed type; the converse is true in the comparison of Holme's figures. Likewise, if the uterus be lax, according to the writer's cases, the concealed type has a considerably smaller mortality than for the relatively concealed. We would hold, therefore, that these figures are too few in number for the determination of basic principles, but believe their suggestiveness warrants the assumption that a tense uterus is due to the presence of some tonicity, some ability of contraction—is, in fact, one of Nature's protective agents in this dangerous complication. On the other hand,



in toxemic apoplexy, we believe it is a fair assumption to hold that the remarkable hardness is not due to tonicity of the muscle, but a marked degenerative (coagulation?) change incident to the action of the specific poison.

We have endeavored to trace a possible relationship between certain (the cases described as tense) examples of accidental hemorrhages and toxemic apoplexy. In Chart 2, the first and second columns present respectively the gross mortalities in the collections of Goodell and Holmes. Column 3 shows the mortality of all their cases (both relatively and absolutely concealed) described as tense, which was 28.7 per cent. Column 4 depicts a similar assembling of all the cases given as lax. If you please, for the moment, we shall assume all cases of uteroplacental apoplexy (column 8) have a tense uterus, though Willson did not show that this was the invariable rule; his mortality was 55 per cent. It would hardly be tenable to declare that the 66 cases characterized as tense by older authorities, with a mortality of 28.7 per cent were instances of apoplexy, and could hardly be comparable to type to those of Willson. Columns 6 and 7 illustrate the enormous advantage accruing to women with this complication if they are attended in a clinic or by an individual where prompt recognition and early delivery are possible.

5. *Shock*.—So far as we may elicit facts from the study of these many cases, shock is present only in those women in whom the uterine distention is developed with great rapidity. Anemia contributes to it; is directly the consequence of a sudden alteration of the uterine size, the stretching and tearing of the uterine peritonemum, or reflexly aroused by irritation of the sympathetic nervous system. We have never seen it develop in mild cases, nor in those women whose complication took an insidious course.

6. *Violent Fetal Movements*.—This is an extremely characteristic sign if the placenta has been suddenly separated; the sudden arrest of aeration of the fetal blood will determine a marked activity during the throes of a lethal asphyxia. As the placenta generally is slowly separated, comparable to the mechanism of the Schultze separation of the placenta in the third stage, asphyxia slowly develops with a quiet death of the fetus. Numerous reports state the baby was blanched on delivery; probably not a few of the babies die not so much from asphyxia as from hemorrhage, the result of the tearing of a cotyledon.

7. *Blood Pressure*.—It would be eminently desirable to have a more general record of blood pressure readings in relation not only to the toxemic types of placental separation, but the ordinary ablations as well, for they may furnish valuable clinical data for the differentiation between them. Willson has shown that only 9 cases had had pressure readings; these maximum readings were 100, 120, 160, 170, 174.

180, 200, 260, 280, the last being in an eclamptic with toxemic apoplexy. In the writer's case the blood pressure was 120. The query naturally is made, are low pressures indicative of pure instances of apoplexy, and the high ones suggestive of a complication with pre-eclampsia? Blood pressure readings will be valuable only when we shall have a series taken before the development of symptoms (during prenatal care), as well as during the actual attack. Single readings, especially if low, have lost much of their significance, in that large bloodlosses will depress the blood pressure.

FREQUENCY

Since the writer's paper on *ablatio placentae*, in 1901, there has been a more general acceptance of the fact that premature detachment is not such a rarity as had been previously believed. While that paper was in preparation representatives of two of the large European clinics stated that no instance of such complication had occurred in the institutions during their residence, though, at Dublin, their annual incidence was as great as that for placenta previa. Harwar reports 254 cases of ablatio in 100,000 labors in the New York Lying-in Hospital—a frequency of 1 in 395; Cragin, at Sloane, found the incidence as 1 in 94, or 212 cases in 20,000 labors. It is within safe bounds to assert that the clinic frequency is about 1 in 500, and of pathologic interest 1 in 200. Couvelaire's uteroplacental apoplexy at the present time must be held to be extremely rare; now that cesarean section is so insistently advocated as a routine for ordinary ablatio we shall hear more of the toxemic form, for a positive diagnosis now may be made only at the time of a section, or on the postmortem table.

PROGNOSIS

The first and fundamental factor in achieving a happy termination is the prompt recognition of the complication; we believe this is of greater consequence than the method of delivery selected. If columns 6 and 7 (Chart 2) indicate anything it is the truth of this assertion. The delays incident to a misconception of the true condition, in a belief that the disturbance is due to some gastric crisis, intestinal flatulence or colic, some cardiac failure, or some abnormal manifestation of the onset of labor, are but to place the patients in increasing jeopardy. We are entirely convinced that the first endeavor should be directed towards the interpretation of evidences of systemic blood losses by the facies, the heart action, respiration, and complete blood counts, with estimation of hemoglobin repeatedly made; the secondary symptoms as nausea, faintness, pains, uterine consistency, uterine distention, are but contributory evidences of the disease. To await a diagnosis until external bleeding has occurred is but to anticipate

death. We believe the fact that absolutely concealed cases carry a higher mortality in some quarters over the relatively concealed cases is sequential to the delay in diagnosis and the resulting delay in delivery. We believe a uterus which responds to the stimuli which determine contractions depresses mortality, while a lax, irresponsive uterus contributes to a higher mortality. The very fact of an extremely tense uterus, with absolute concealment, contributes to an arrest of hemorrhage, because at the moment when intrauterine pressure approximates that of the blood pressure, bleeding ceases, and coagulation of the blood may occur. A lax uterus will admit such colossal accumulations of blood that bleeding stops only when the blood pressure reaches near zero—that is, when the woman is exsanguinated.

The size of the sinus, or sinuses, exposed by separation may be of greater importance in contributing to death than a very widespread separation, or complete separation, for in the latter early thrombosis of uterine sinuses may occur. The greater the separation of the placenta, the greater is the jeopardy to the baby from asphyxia.

In toxemic apoplexy, so far as we may interpret the few cases recorded, death occurs more from the effect of blood losses than from the toxemic state. The data thus far presented precludes an estimate of the respective values of these two elements from a prognostic point.

Charts 1 and 2 graphically present the mortalities for mother and child under different conditions, and periods. Contributory to these charts, Cragin lost 12 women, and 122 babies, 5.7 and 57.5 per cent respectively.

A BRIEF SUMMARY OF THE AUTHOR'S 22 CASES

Age.—Data not recorded in 3 (Cases 1, 3, 20); 20-24 years, 4 (Cases 4, 10, 14, 18); 25-29 years, 5 (Cases 2, 6, 11, 17, 21); 30-34 years, 4 (Cases 5, 7, 12, 15); 35-39 years, 6 (Cases 8, 9, 13, 16, 19, 22). As 9 women were under 30 years of age, and 10 were over, these cases suggest that the incidence is proportionately greater with advancing years.

Parity.—Parity not recorded in 1 case. Primiparae, 5 (Cases 10, 14, 18, 20, 22); iparae, 6 (Cases 2, 4, 11, 16, 17, 21); iiparae, 1 (Case 5); iv parae, 2 (Cases 7 and 15); v parae, 1 (Case 19); vi parae, 3 (Cases 6, 9, 13); vii parae, 1 (Case 8); viii parae, 1 (Case 8); ix parae, 1 (Case 1). Therefore, 22.8 per cent were primiparae.

Gestation Period.—Fifth month, 1 (Case 7); 6th month, 1 (Case 21, violent blow on abdomen determined the separation; she went to term); 7th month, 5 (Cases 10, 12, 14, 19, 22); 8th month, 2 (Cases 2 and 13); 9th month, 2 (Cases 4, 13); at term, 10 (Cases 1, 5, 6, 8, 9, 15, 16, 17, 18, 20).

Hemorrhage.—External hemorrhage was absent in 4 (Cases 11, 16, 17, 18). Case 12 had no external bleeding until 62 hours after the onset of symptoms. Case 13 went 24 hours before external bleeding occurred. Case 22 was concealed 8 hours, then slight oozing. Blood serum was expelled in 4 (Cases 5, 7, 11, 12). Hemorrhage was profuse in 14 (Cases 1, 2, 3, 4, 5, 6, 8, 9, 10, 12, 13, 14, 20, 21); in some, hours elapsed before the change from concealed to patent bleeding occurred.

Tonicity of Uterus.—The uterus was tense or tonically contracted in 5 (Cases 2, 9, 15, 20, 22). The uterus was boggy in 1 (Case 12). In 16 cases the uterine consistency demonstrated nothing abnormal.

Mild Forms.—Four were so noted (Cases 15, 16, 17, 18)—of these 16 and 18 gave no antepartum sign to cause alarm.

Etiologic Factors.—Heavy work was assigned as the cause in 2 (Cases 2, 13); traumatism, 2 (Cases 19, 21)—Case 19 was an albuminuria for which induction by catheters was done—in 17 hours hemorrhages occurred; Case 21 at 6th month was struck by a heavy swinging door, collapse, labor pains for 2 weeks, then went to term. Case 10, turpentine poisoning, taken with suicidal intent, was followed by the complication. Nephritis (albuminuria) was present in 6 (Cases 9, 17, 19, 22; Cases 4 and 11 eclamptics).

Maternal Mortality.—One mother died as a result of the hemorrhage, Case 2. Case 11 died in an eclamptic convulsion; she had absolute concealment, and unquestionably was benefited for a time by the antepartum blood loss. Therefore, there was 1 maternal death due to premature separation.

Fetal Mortality.—A fatal issue occurred in 13 infants (1, 2, 4, 5, 7, 8, 9, 11, 12, 13, 16, 19, 22) all being born dead. The child from Case 14 died on the tenth day, being born in the seventh month. The children of 9 women lived; in Case 3 the signs of detachment appeared after the birth of the first of twins—prompt version and extraction saved the second baby. The fetal mortality was 60.9 per cent.

Method of Dilatation.—Bags were used in 5 cases (2, 4, 5, 10, 17). Manual dilatation was employed in 8 (Cases 2, 8, 9, 11, 12, 14, 17, 20). Manual dilatation was used in Case 2 after the bag burst, it being defective. Case 17 had a bag induction for albuminuria; the bag produced a brow presentation which was manually corrected, the head pressed into the brim, followed by spontaneous delivery.

Method of Delivery.—Spontaneous delivery took place in 6 (Cases 1, 6, 15, 16, 17, 18); forceps were used in 6 (Cases 2, 9, 11, 14, 19, 20); craniotomy was employed in 2 (Cases 5, 13); version, with rapid extraction, was performed in 5 (Cases 3, 4, 8, 10, 12); manual aid was necessary in 1 (Case 21); hysterectomy was necessitated in Case 22

for toxemic uteroplacental apoplexy. The method of delivery was not recorded in 1 case.

ILLUSTRATIVE TYPES OF ABLATIO PLACENTAE

Mild Type.—No. 15, 1910. Mis. M., age thirty-four. First and second pregnancies complicated by placenta previa: third labor normal. She passed through her fourth pregnancy uneventfully, no urinary disturbance, no edema. Labor began in the early morning: infrequent, painless contractions all day: at 10 P. M. expelled an ounce of blood; at 11:15 P. M. contractions began to cause discomfort. The uterus was firmly contracted continuously; ligaments diverging, membranes ruptured spontaneously at 12:15 A. M. when os was dilated. Child spontaneously born with second pain after the rupture of the membranes. The opening in the membranes was 5 inches from the lower placental border; at upper part of placenta there was a deep depression, 3 x 1 inches, filled with a firmly adherent old clot. About half a pint of old blood was expelled with the placenta.

Absolutely Concealed Type—Eclampsia.—Case 11, 1905, Mrs. H. F., age twenty-six. Abortion at 3 months a year before, the result of a fall. Nervous type of woman, worried over minor details. Much debility the first 3 months of pregnancy. Labor due June 23rd. May 5th had a trace of albumin, no casts. May 10th went to her summer home for a few days' rest. On the 12th, at 4:30 P. M., while buggy riding, had a gush of clear vaginal fluid, interpreted by the physician as a premature rupture of the membranes, but which was proven later to be blood serum. At 6 P. M. she went to bed feeling well, but as if labor were imminent. At 7 P. M. had a severe nausea, soon followed by excessive emesis. At 9 P. M. was seized with a severe headache, followed in half an hour by a convulsion; a short coma, then quiet sleep. On my arrival at 4 A. M. there was a second convulsion. Preparations for delivery quickly made. Examination showed a soft cervix, os admitting 2 fingers, abdomen demonstrated nothing characteristic. Just before operation some slight bloody discharge; persistent slight bleeding during dilatation. Full dilatation secured in about half an hour. Head depressed into the pelvis, low forceps applied, head delivered. Dead female child, weighing 2760 grams. Placenta and old clots manually removed, then tamponade. Fully two-thirds of the placenta showed compression, the cup containing an old clot firmly adherent to the placenta; about a quart of old blood came with placenta. At 4:45 P. M. she had a third convulsion, the coma continuing until death at 10:20 P. M. A catheterized specimen taken during the course of the condition showed the usual findings.

Toxemic Uteroplacental Apoplexy.—Case 22, 1922. Mrs. E. A., age thirty-five. Primipara. Labor due Oct. 17th. On Aug. 22nd, being then in her 32nd week of pregnancy, had a disagreeable sensation in her abdomen after a light breakfast; by 10 A. M., when admitted to the hospital, this discomfort had developed into a continuous severe pain, which persisted until the operation. On admission the uterine souffle was heard, but not later, probably a pathognomonic sign of a uterus under high tension. The interne thought he heard heart tones at 11 A. M., but this is questionable. At 2:30 P. M. a slight bloody show. At 4:30 P. M. we saw her for the first time. She had a generally contracted pelvis, the promontory being easily palpable through the rectum; also a lumbosacral scoliosis was present. On admission pulse and temperature were respectively 82 and 98.2°; at 4 P. M. they were 92 and 99.4°. Abdominal examination was utterly futile, as nothing was palpable except a symmetrically placed uterus, under such tension that it was likened to an over distended football. The lower uterine segment was bulging into the vagina under high tension; the os was closed. No albumin was present 2 weeks before, but was found as a trace on entry to the hospital. Blood pressure was 120. A

diagnosis of *ablatio placenta* was made, probably of the toxemic type from the extremely high uterine tension, as we never had seen a uterus with such excessive rigidity.

Cesarean section was elected in view of the findings. On opening the abdomen, the uterus presented itself as a symmetrically enlarged, hard body, with marked discolorations distributed over the surface; these ranged from almost punctate to grossly large purple to blue black areas; in many places these colorations were in the form of striae. A large vein, with many branches on the anterior wall, was highly dilated. The uterine contents were under such high pressure that on opening the amnion, the pinkish liquor amnii described a trajectory, striking at the patient's feet. As soon as the uterus was fully opened, the dead fetus, weighing 2625 grams, was extruded into the incision; the placenta was entirely loose and was lifted out with a number of massive clots. The uterus had the consistency of old sole leather soaked in fluid; in spite of repeated injections of pituitrin, hot compresses, massage, and injections of ergot deeply into the thigh muscle, the organ showed no evidence of contraction or retraction. During the delay the uterine incision did not ooze at all. Supravaginal hysterectomy was then done, leaving the tubes and ovaries which showed no evidence of disease. The patient left the table with a weak pulse, 168, which continued high for eighteen hours, then rapidly improved: the temperature ranged from 99° to 103.5° during the first three post-operative days, then dropped to normal. She had an uneventful recovery.

THE PATHOLOGY OF THE SPECIMEN

The Uterus.—Macroscopic appearance. Examined about two hours after operation. The organ was still boggy, not contractile. An apparently healthy portion of the peritoneum comprised the middle of the fundus, encroaching somewhat on the anterior wall, and to a greater extent on the upper posterior wall. This portion of healthy surface is of a light blue gray color, contrasting strongly with the other parts of the peritoneal surface. In the neighborhood of both horns, running down anteriorly and posteriorly, there is marked discoloration; on the lower posterior wall there is a large blotching with some striation. Anteriorly, the discolorations assume striations. The color ranges from a dark blue, to almost blue black, giving a mottled appearance to the whole organ. Somewhat over one-half of the serous coat is included in these subperitoneal hemorrhages. Neither serous fluid, nor free blood had been found in the abdomen; there were no peritoneal ruptures on the uterus. The placental site was on the upper posterior surface, and showed marked convolutions. The vessels of the broad ligaments were gaping broadly. The specimen was practically dry on removal from the abdomen, but when examined dripped blood from the cut surfaces. This was in sharp contrast to the extraordinary fact that there was not the slightest oozing from the uterine incision during the operation, either before or after emptying the viscus. The cut surfaces of the cesarean wound, as well as the raw surfaces of the hysterectomy showed subserous as well as interstitial hemorrhages, clearly visible to the naked eye.

Microscopic Findings.—The nuclei of the uterine muscle did not take the stains well. In almost every field (Fig. 1) the individual fibers showed evidences of separation; here and there fasciculae were likewise segregated; between the separated fibers and muscle bundles were varying amounts of blood accumulations, showing a very wide distribution of these minute hemorrhages. Scattered through the whole muscularis, even at the lowest portion of the uterine body (Fig. 2), syncytial cells were visible. At various points, leucocytes (Fig. 1) were found in great abundance, the polymorphonuclears greatly predominating; in some vessels clusters of polymorphonuclear cells were seen, filling the caliber of the vessel; in others the vessels

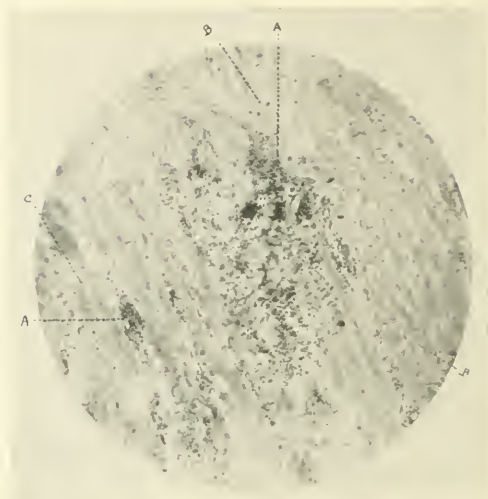


Fig. 1.—x 155. Uterus. A, Muscle fibres and fasciculae separated by blood; B, syncytia; C, leucocytes.

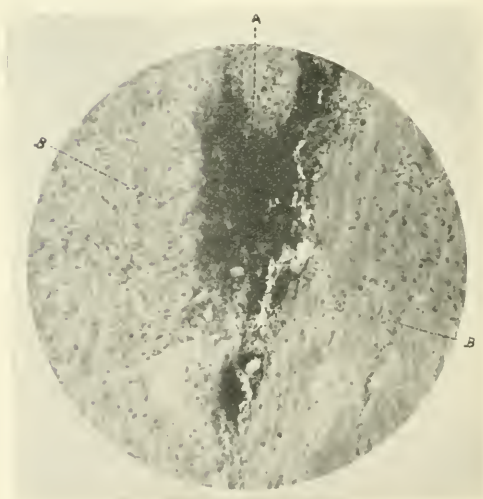


Fig. 2.—x 155. Uterus. A, Blood; B, syncytia.



Fig. 3.—x 155. Placenta. *A*, Large villus which has undergone hyalinization; *B*, villus slightly degenerated; *C*, villus with a nearly normal area and portion which has become hyalinized.

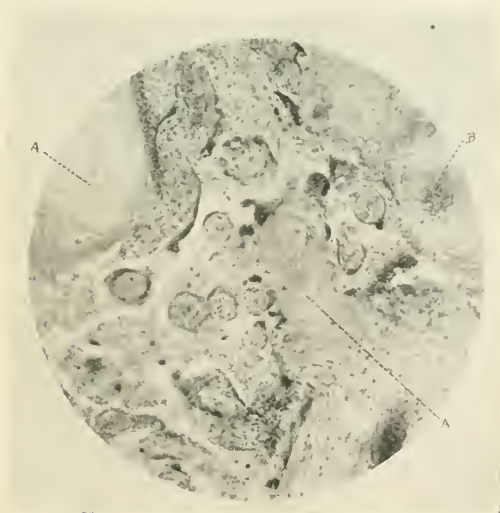


Fig. 4.—x 155. Placenta. Slightly degenerated villi, with *A*, hyalinized villi; *B*, closed blood vessel of villus.

were patent but empty, while in others the walls were contracted, completely closing the lumen. Some vessels apparently were thickened.

The Placenta.—Macroscopic appearance. The organ had a cordiform shape, the cord arising eccentrically from the hilum. The thickness of the structure varied—at the apex, and the two lower portions suggested a lobate form, these being thicker than the central portion. Firmly adherent to the placenta was a flattened clot. This clot weighed 200 grams; a loose clot expelled with the placenta weighed about 480 grams. At the periphery of the placenta, encroaching onto the membranes, were small clots; the intercotyledonal spaces, likewise, contained clotted blood. There was no evidence of a depression on the maternal surface, demonstrating that the placenta must have been quickly shed.

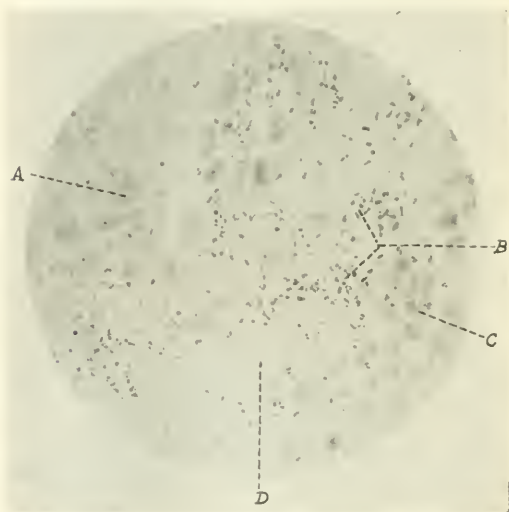


Fig. 5.—x 315. Placenta. A, degenerated villous cells; B, groups of polymorphonuclear leucocytes; C, partially degenerated cells; D, area comprising completely degenerated villous cells.

Microscopic Findings.—Many of the villi were characteristically normal for a mature placenta, all the cellular elements being clearly demonstrable. In juxtaposition to a normal villus we find a small one containing essentially normal structure, with a small portion, either central, or eccentric, which has undergone hyalinization (Fig. 3, c). Occasionally, a large villus, cut longitudinally, will show an almost complete absence of cellular elements (Fig. 2, a)—it has undergone necrobiosis or degeneration. Yet a neighboring villus will contain all of its elements intact. Fig. 4 shows a villus vessel completely closed, and its wall thickened. Some villi which have undergone central degeneration will have almost perfect syncytial borders as of a mature placenta, in others this border has completely disappeared. Some of the vessels of the placenta, especially those under the amnion, are fully dilated, and empty or containing a few blood cells. In the villi, especially the small ones, the vessels are completely closed (contracted, with the intima convoluted); fre-

quently, a vessel is found dilated and filled with blood, or leucocytes. One such vessel was filled with 9 polymorphonuclear leucocytes. In Fig. 5 we see partially degenerated villous cells (*a*), but at (*c*) the cells have not undergone such a high degree of degeneration, and at (*d*) a completely degenerated area; at (*b*) are leucocytes; the polymorphonuclear types are very greatly predominating. In Fig. 6, at (*a* and *c*) are lymphocytes and polymorphonuclear cells in abundance; at (*b*) is a villus vessel containing red cells; (*d*) shows syncytia degenerated; (*e*) is the maternal blood space washed out.

Comment on the Specimens.—The profusion of the leucocytes, with the great predominance of the polymorphonuclear type, both in the

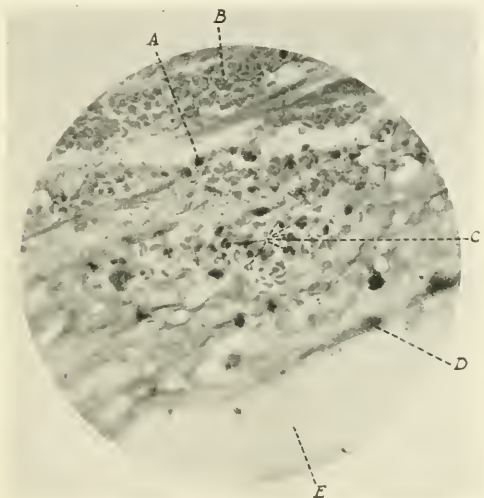


Fig. 6.— $\times 560$. Placenta. *A*, lymphocytes; *B*, red blood cells in villous stream; *C*, polymorphonuclear leucocytes; *D*, degenerated syncytia; *E*, maternal blood space washed out.

uterine musculature and in the placental villi, points indisputably to some inflammatory reaction. Their presence gives some tenability to the old opinion that inflammatory processes were responsible for many cases of ablatio. Certainly their appearance would hardly be interpreted as results of the toxic irritation. Neither would we be willing to maintain that the fair profusion of syncytia through the muscularis is indicative of a possible etiologic factor, even though Veit and Ascoli acclaimed that the syncytium was responsible for a type of toxemia—eclampsia. We question that the syncytium was present in excess of that found normally in uterine muscle in the latter weeks of pregnancy. As we see it the hyalinization of entire villi,

or parts of single ones, does not conform to the usual picture of the development of infarction. From the gross appearance of the placenta we feel inclined to believe there was a sudden complete separation of the organ from the uterine wall, which caused the sudden death of the fetus. Therefore, the changes which determined a leucocytic infiltration of the maternal uterine muscle, must have operated before the placental separation, since the villi were likewise infiltrated; too, the deposit of leucocytes within the villous vessels must have occurred before the death of the fetus, i.e., before the placenta separated. Berggren found polymorphonuclear leucocytes within the maternal vessels, but does not state that they were found in the muscularis itself; Ley states there were perivascular deposits of lymphocytes in the uterine wall and decidua.

Willson has so adequately covered the subject of the pathogenesis that it would be needless, even a supererogation, to cover the field again in a clinical study; however, we would ascribe the hemorrhagic condition of the uterus as due to some toxic substance which destroys the continuity of the small vessel walls, but in addition we are inclined to believe there is some basis to Morse's allegation that mechanical processes do contribute to the production of ablatio, modified though this opinion is. We believe the mechanics may be thus stated: the toxic element produces a hypertension of the uterine wall, which promptly decreases, if not entirely impedes, the venous flow; during the congestion which follows, the minute vessels are ruptured, extravasation of blood takes place, aided by a delayed coagulability of the blood. In part we have the analogy in the production of the rapid growth of an ovarian cyst when the pedicle has twisted, and in part directly sequential to the action of an irritating poison.

Certainly we are approaching the truth when we accept the accumulating evidences of a toxic origin for Couvelaire's type. We are extremely loath to believe that toxemia is responsible for all instances of ablatio; the time has not yet arrived when we may deny an inflammatory basis for the production of certain ablatios, neither may we deery the opinion that placental or serotinal degenerative changes may produce serotinal ruptures which effect a premature separation of the placenta.

DIAGNOSTIC DIFFERENTIATION OF TYPES

Clinical experience has not yet produced a characteristic differentiation between ordinary ablatio and the toxemic type; no individual has had sufficient numbers of the latter to permit a formulation of rules which would lead to a clinical diagnosis of toxemic apoplexy; in fact, as already stated, we believe clinicians have been too prone to declare that ablatio generally has an array of pathognomonic symp-

toms which permits him who runs to read. This is so untrue that only too many cases of accidental hemorrhage are not recognized, because the attendants have been misled by such allegation. It is a reiteration of what already has been stated, but it is worthy of repetition: there is not one symptom or combination of symptoms of ablatio which may not be present or glaringly absent in specific instances of the complication *except evidences of anemia*, and too often this blood loss is not interpreted correctly. Granted that a diagnosis of premature detachment of the placenta has been correctly made, are there any symptoms or laboratory findings which will contribute to a differentiation between ordinary types and the toxemic form? As the recognition of accidental hemorrhage is often attended with great difficulty, and inevitably, in many instances, only with the development of distinctive features during a protracted period of waiting, it is manifestly a greater problem to recognize the special form due to the toxemic etiology.

Common experience will clear up many of the moot points. In the meanwhile, we would offer three diagnostic points which may contribute information leading to the recognition of Couvelaire's form of placental separation: (1) undue hardness of the uterus; (2) presence of toxemic symptoms (urinary disturbances); (3) elevated blood pressure.

1. *Undue Hardness of the Uterus.*—As we have shown in the earlier parts of this paper there is no evidence to substantiate the assertion that undue hardness is an inevitable and constant physical accompaniment of *all cases* of so-called accidental hemorrhages; in fact of 306 cases this sign was noted 66 times—21.2 per cent; while in our 21 personal cases 5 were noted as of unusual tonicidity—22.8 per cent. In our 22nd case, that of toxemic apoplexy, the uterus was of such remarkable hardness that we made a presumptive diagnosis of the true type from that sign alone, as it was truly unique in our experience. Willson does not supply the data which permits him to assert, with Williams, that ligneous hardness is a pathognomonic sign, though perhaps he accumulated the data on this point and neglected to include it in his paper. Be that as it may, we may claim, until the contrary is proven, that an unusual hardness is pathognomonic of the toxemic variety, though it is by no means a definite finding in ordinary ablatio.

2. *Presence of Toxemic Symptoms.*—Here we may have added support in the determination of the true condition, but our patient showed small signs of a toxic state. The improvement incidental to blood letting in toxemias would depress in many women much of the evidence of toxemia of mild type; the hemorrhage incidental to premature separation of the placenta, likewise, will overcome many of the tox-

emic manifestations in Couvelaire's type which would preclude, ordinarily, much reliance on this phase of the question.

3. *Blood Pressure.*—This is but a corollary of the above, but it also does not contribute much information in view of the fact that but in 9, with ours, 10 cases was there an observation of pressure made. These readings ranged from below normal to 280, and 30 per cent were 120 or below.

TREATMENT

A radical method of procedure for all instances of ablatio is indefensible—there must be a natural selection of cases—what may be appropriate for one would be intolerable for another. To recommend a routine cesarean section for all recognized instances of ablatio would be to enhance the already high death rate, a rate which is needlessly great. As a tentative guide we may suggest the following:

Mild Types.—There may be no discussion but that nearly all women seized with one of the various types of ablatio should have an expeditiously conducted delivery. Some mild examples may be properly treated expectantly; the attendant must be certain of his ground if he plans to tide the patient over the trivial symptoms; the woman should be in a hospital during such watchful expectancy, and should have every safeguard placed about her, for she may have a sudden change from the mild into a dangerous form. In general, we would advise that such women, with babies of viable age, should have labor induced by a large bag. If the attack comes on in labor the latter should be terminated as quickly as conditions will permit.

Severe Types. (Prompt Recognition.)—Immediate preparation for delivery. We have found manual dilatation, Harris with Edgar Bonnaire methods, to meet conditions adequately, as we never have seen a rigid os in connection with an ablatio. A vaginal cesarean section is not seemly, as the manipulations permit the escape of the uterine blood which befouls the field and makes the operation of great difficulty. Version is performed as soon as dilatation is secured, and rapid extraction with Kristeller expression follows. Manual removal of the placenta should be done at once, if the placenta does not come with the child. Remove all clots from the uterus; postpartum uterovaginal tamponade should be a routine measure. If the conditions are appropriate, do a craniotomy, or forceps if the child be suspected or known to be alive. Pituitrin should be given during the extraction. Give saline transfusion, followed by blood transfusion as soon as possible.

Fulminating Cases.—In the home and in the small hospital, these patients may more happily be treated as above. In the hospital where preparations for operation may be quickly made, and with a trained per-

sonnel, an abdominal section is the wise expediency. The uterus should not be removed unless it shows extreme atony and does not react to the known expedients for securing contraction. We have never employed an intrauterine tamponade after a cesarean section, introduced either from above or below, but gauze might be thus used rather than the removal of the uterus. We feel the introduction of a liter of saline solution into the abdomen just before closing the peritoneum is a wise precaution. There should be a blood grouping of the patient and friends, so a transfusion may be given at the earliest possible moment.

Toxemic Type.—A number of the readers of Willson's paper have argued with the writer, that, as all (18 in number) of the women in his compilation who had vaginal deliveries had died, an abdominal cesarean was absolutely the only recourse; this list includes 12 operative (obstetric) deliveries, 4 spontaneous births, and 2 vaginal sections. Such is utterly fallacious reasoning as no account is made of the numbers who had toxemic apoplexy, unrecognized, and yet recovered after a vaginal method of delivery. If we argued that vaginal delivery spelt death to all women who had a toxemic apoplexy, then, to continue our logic, we should maintain that death supervened as a result of the retention of the uterus. If this were sound reasoning then we should demand that hysterectomy must be an integral part of all cesareanized women who have toxemic apoplexy. But Willson's hysterectomy mortality was 47.6 per cent (21 cases, 10 deaths), while conservative sections had a mortality of 19 per cent (21 cases, 4 deaths). The presence of hemorrhagic areas in the uterus in toxemic ablatio is in no wise indicative of the necessity for a hysterectomy; the sole indication for such mutilation is the failure of the organ to react after the application of the usual approved methods of stimulation.

We believe the scanty knowledge now available does not warrant the recommendation of a routine laparotomy for all cases of ablatio, nor for the toxemic type. The real benefit of a laparotomy comes from the fact that a diagnosis in life may be made only by such operation. Without opening the abdomen the diagnosis of toxemic apoplexy is purely conjectural. An additional advantage from the cesarean section lies in that the uterus may be removed, if a dangerous degree of atony obtains.

In conclusion, we would suggest that better results will generally obtain if suspected cases of toxemic uteroplacental apoplexy are treated as outlined for ordinary ablatio.

In closing, I would thank Dr. M. T. Nelson, my associate, for his interest manifested at the time of the operation and preparation of the specimen of toxemic apoplexy. Also, I desire to express my appre-

TABLE I

ABLATIO
ETIOLOGIC AND

NO.	DATE	NAME	AGE	PARA	PERIOD GEST.	ETIOLOGY	RELATION TO LABOR	TYPE OF LABOR	A. P. CONDITION	
									INFANT	MOTHER
1	1897	H. B.	?	ix	Term	? No edema	In labor	Active 17 hrs. Uterus tonic. R.O.P.	Heart not heard.	After 14 hrs. weak
2	1899	Mc A.	25	ii	5th mo.	Heavy work of moving home. Has had en- dometritis for some years. Uri- nalysis neg. few days before.	Before	No real labor. Dil. 2-3 fingers at onset L.O.P.	Heart not heard positive- ly	Anemic, Pulse rapid.
3	1899	K.	?	?	?	Twins: Se. L. P. 2nd ROA.	In labor	Active	Good Good	Fair
4	1903	E. B.	22	ii	Near Term	Eclampsia. 3 A.P. con- vulsions, 1 P.P.	?	Active after b a g placed.	Heart not heard.	Fair, temp later 101, p. 128
5	1903	K. S.	32	iii	Term	Chronic en- dometritis- deciduitis.	Before & in labor	Irrag.	Heart not heard Cord pro- lapsed.	Withal in good condi- tion.

TABLE I

PLACENTAE

SYMPTOMATIC TYPES

SYMPTOMS	TIME HEM. CON- CEALED	CONDI- TION MEM- BRANES	DURA- TION DISEASE	METHOD OF DE- LIVERY	RESULT		PATHOLOGY
					MOTHER	BABY	
Three hours after onset of labor, persistent, repeated hemorrhages. Child, plac. and massive clots expelled with one pain.	For 3 hours.	Ruptured $\frac{3}{4}$ hour before delivery	About 15 hours	Spontaneous. P.P. Ut.-Vag. Tampon.	Recov.	Died 36 hours	Deeply compressed area on mat. surface of placenta.
2 A.M. nausea, emesis, 4 A.M. hemorrhage; bleeding arrested by tampon for time. Uterus tonic at times.	2 hours.	B.O.W. rupt. 2 hrs. before del. as bag burst.	14 hours	Tampon until R.W.H. came. De Ribes bag, digital dil High forcep Ut.-vag. tampou. Man. removal placenta.	Died	Dead	About $\frac{1}{4}$ plac. compressed by firmly adherent clot. Much blood expelled with placenta.
After 1st baby was turned and delivered, profuse hemorrhage.	Ext. bleeding at once	Immediate Rupt. B.O.W.	Few moments	Version, Extraction	Recov.	Lived	?
3 convulsions in hour, carried expectantly 36 hours, then labor, repeated bloody discharges. Liq. amnii of dirty color.	?	Rupt. $1\frac{1}{2}$ hrs. before del.	Some hours	Voorhees bag, version, ext. P.P. tampon	Recov.	Macerated	Maternal surface of placenta showed areas of separation.
1st 3 months almost constant hemorrhages: monthly thereafter would expel at these times watery fluid, <i>dark lumps</i> : 2 weeks before labor brisk hemorrhage. Constant pain last 13 days.	Apparently entirely patent.	Spont. rupt. 6 hrs. A.P.	Some weeks	Braun bag Crauiotomy Ut. Tampon P.P.	Recov.	Dead	Deciduitis.

TABLE I—CONT'D

ABLATIO
ETIOLOGIO AND

NO.	DATE	NAME	AGE	PARA	PERIOD GEST.	ETIOLOGY	RELATION TO LABOR	TYPE OF LABOR	A. P. CONDITION	
									BABY	MOTHER
6	1903	S. C.	29	vi	Term	?	In labor	Active	Heart reg. 126	Fair
7	1903	M. G.	30	iv	5 mos.	No edema.	In preg.		?	Fair
8	1904	B.	36	viii	Term	In 7th labor had hy- dramnious, and hyper- trophic de- ciduitis.	In labor	Active	Heart not heard.	Bad
9	1904	J. B.	38	vi	Term	Albuminuria.	Not in la- bor	None	Heart not heard.	Ex- treme anemia
10	1905	E. C.	20	i	7 mos.	Turpentine taken with suicidal in- tent.	In preg.	Active after Bag.	Heart not heard.	Pre- carious.

TABLE I—CONT'D

PLACENTAE

SYMPTOMATIC TYPES

SYMPTOMS	TIME HEM. CON- CEALED	CONDI- TION MEM- BRANES	DURA- TION DISEASE	METHOD OF DE- LIVERY	RESULT		PATHOLOGY
					MOTHER	BABY	
Profuse hemorrhage 5 to 6 hrs. before delivery — persistent oozing.	Patent	Art. rupt. 30 min. before del.	5 hours	Spon- taneous. Art. rupt. memb.	Recov.	Living	Placenta cordiform. 3 in. from lower border, clot buried in maternal surface.
2nd month watery discharge. In bed 20 days, arising free blood & clots expelled. In 5th mo. painful contraction with gush of clear fluid: Uterus arcuate, after gush ovoid.	Patent	Intact	Weeks	?	Recov.	Died	Data absent.
Hydramnios, rupt. memb. at onset of labor. Arcuate uterus. Accessory tumor in right horn. Slight flow with rupt. B.O.W. later profuse hemorrhage. Sweating, lips pale.	Patent	3½ hours A.P. Rupt. in sleep	3½ hrs.	Manual dilation Incisions. Version.	Recov.	Died	Placenta came with child: large retroplacental clot, adherent, free blood.
In chair, sudden gush of old blood clots & free blood, almost exsanguinated. Uterus tetanically contracted. Accessory tumor on right ant. Placenta loose in uterus.	Patent	Rupt. at onset. 2½ hrs. A.P.	2½ hrs.	Manual dilation High forcep	Recov.	Died	Much old blood came with placenta.
For 3 days uterine pain but no contractions. Repeated hemorrhages for 13 days.	Patent	art. rupt. 25 min. A.P.	13 days	Tam- pons. Bag. Ver- sion. P.P. uterin tampon. Plac. came with Crede	Recov.	Recov.	Maternal surface had depressed area size of palm, old clots.

TABLE I—CONT'D

ABLATIO
ETIOLOGIC AND

NO.	DATE	NAME	AGE	PARA	PERIOD GEST.	ETIOLOGY	RELATION TO LABOR	TYPE OF LABOR	A. P. CONDITION	
									BABY	MOTHER
11	1905	H. F.	26	ii	3th mo.	Eclampsia. Pulmonary edema as final comp.	Not in la- bor	None	Heart not heard.	Coma
12	1905	J. C.	34	vii	7th mo.	No edema.	In labor	Practi- cally none	Heart not heard.	Poor.
13	1906	L. L.	38	vi	Near Term	Lifted heavy wash boiler of water, seized with pain.	In labor	Irreg- ular 12 hours.	Heart not heard.	Good.
14	1909	E. W.	22	i	7 mos.	?	In labor	?	Heart not heard.	Fair.
15	1910	M.	34	iv	Term	Urine Neg. 1st & 2nd labor comp. by placenta previa: both ba- bies dying. Mild type.	Advanced labor	In fre- quent, contrac- tions, painless: 1 hr. hard pain	Good	Good

TABLE I—CONT'D

PLACENTAE

SYMPTOMATIC TYPES

SYMPTOMS	TIME HEM. CON- CEALED	CONDI- TION MEM- BRANES	DURA- TION DISEASE	METHOD OF DE- LIVERY	RESULT		PATHOLOGY
					MOTHER	BABY	
4:30 P.M. while riding, gush of clear fluid, well at 6 P.M. 7 P.M. severe emesis. Headache and conv. 9:30, coma brief. 4 A.M. 2nd conv. 24 hrs. after onset 3rd conv., dying 6 hrs. later in coma.	In night patent. Hours concealed.	1/2 hour before del. art. rupt.	14 hours	Manual dilation. Mid. forcep P.P. ut. tampon.	Died	Died	Fully 2/3 of placenta separated. 325 of clot came with placenta. More manually removed.
Arose feeling faint and dizzy; next morning fetal movements ceased. Soreness right of ut. Noticed ut. growing in size. 48 hrs. after onset fainted, later emesis and collapse. Cold sweats. 60 hrs. after onset passed pinkish fluid. 2 hrs. later pint of black blood & clots. Uterus boggy ant. right, tender, accessory tumor. Ut. tense.	60-62 hrs.	art. rupt. 1/2 hr. A. P.	75 hours	Manual dilation. Version: P.P. ut. tampon Plac. came with baby & quart of old blood.	Recov.	Died	Placenta very thin: decidua plaques adherent to memb. Chorion laeve hypertrophied. At time of version 1/2 plac. found hanging loosely.
After lifting severe pain: next A.M. hemorrhage persistent.	24 hours	art. rupt. 4 1/2 hrs. A.P.	60 hours	Craniotomy	Recov.	Died	Very large retr. plac. clot came in 3rd stage.
After 5 hours labor gush of blood. Accessory tumor on ant. wall.	?	8-9 hrs. after onset labor	?	Manual dilation High forcep	Recov.	Alive died 14 day	
Uterus was very firmly contracted continuously: uterine os dilated almost painlessly. 2 hours A.P. about 1 oz. of blood expelled.	Unknown	Spont. 10 min. A.P.	?	Spontaneous	Recov.	Recov.	Opening in membrane 5 in. plac. border. Area of 3x1 in. compressed, cup containing firmly adherent clot.

TABLE I—CONT'D

ABLATIO
ETIOLOGIC AND

NO.	DATE	NAME	AGE	PARA	PERIOD GEST.	ETIOLOGY	RELATION TO LABOR	TYPE OF LABOR	A. P. CONDITION	
									BABY	MOTHER
16	1911	J. G.	36	ii	Term	No symptoms, no external hemorrhage. Baby born pallid. Mild type.	In labor	Cont. for 7 hrs. Begun 5 hrs. after B.O.W. rupt.	Good 2	Good
17	1913	A. M.	27	ii	Term	Marked albuminuria, bag introduced account toxemia. Digital correction of brow, reposition of cord cause separation? Mild type.	In labor?	Active 10 hrs.	Good	Toxic.
18	1914	R. B.	21	i	Term	No albuminuria. Mild type.	In labor	Irreg. cont for 36 hrs., then reg.	Good	Good
19	1919	E. J.	39	v	7th mo.	Could catheters be responsible for separation? Very possibly. Nephritis.	In labor	Active	?	Fair
20	1920	F. J.	?	i	Term		In preg. later labor	Weak, irreg. cont.	Heart heard	Anemic
21	1921	J. R.	25	ii	6 mos.	During violent wind-storm ran to close windows: heavy swinging door blown open striking the abdomen. Traumatic ablatio in preg.	In preg.	None	Heart heard	Poor, later improved.

22*

*For Case 22, see text.

TABLE I--CONT'D

PLACENTAE

SYMPTOMATIC TYPES

SYMPTOMS	TIME HEM. CON- CEALED	CONDI- TION MEM- BRANES	DURA- TION DISEASE	METHOD OF DE- LIVERY	RESULT		PATHOLOGY
					MOTHER	BABY	
Gave no symptoms.	Until P.P.	Spont. rupt. 12 hrs. A.P.		Spon- taneous	Recov.	Died	Expelled large clots, old, with placenta.
No hemorrhage be- fore delivery. Brow pres., corrected, prolapsed cord re- posed.	Entire labor	Not known when B.O.W. rupt.	?	Correc- tion Brow, then spont.	Recov.	Recov.	8 or more ounces of blood ex- pelled with plac. Old clots.
Gave no A.P. symp- toms.	Entire labor	spont. rupt. 5 hrs. A.P.	?	Spon- taneous	Recov.	Recov.	Large old clot in de- pression on mat. sur- face of pla- centa.
Lost pint of blood 2 hrs. A.P. and 17 hrs. after catheters placed.	?	Art. rupt. 30 min. A.P.	?	Low forcep Labor induced by ca- theters.	Recov.	Died	Depression in plac. size of palm, filled with old clot.
5 days before labor severe hemorrhage. Labor 21 hours. After about 16 hours of weak labor sudden hemorrhage, depleting mother. Uterus <i>Tense</i> be- tween contractions.	?	Art. rupt. 45 min. A.P.	5 days & more	Manual dila- tion: high forceps. Tampo- nade.	Recov.	Recov. Asph. pallida	Opening in placenta 3 in. from placenta. signs plac. separa- tion. Old blood clots expelled.
After accident great pain: continuous: 5 hours later sud- den severe pain, ex- pelled free blood, much over pint, and clots. There- after uterine con- tractions for 2 weeks: tender ab- domen. Then symp- toms subsided, go- ing to term.	About 5 hours	Intact	2 weeks	Spon- taneous labor: manual aid for breech.	Recov.	Recov.	Placenta bi- partate, lobes equal In one was depression 3 in. long containing a clot, putty in color.

ciation of the energy and interest shown by Mr. C. B. Shafer Evans in making an exhaustive preparation and study of innumerable sections of the uterus and placenta, that the microphotographs might demonstrate the ocular findings.

CONCLUSIONS

1. The present state of our knowledge permits a classification of three etiologic groups of accidental hemorrhage—(A) traumatic; (B) local degenerative or inflammatory changes in uterus, placenta, and decidua; (C) systemic or toxemic.

2. The first group, though small, may be definitely placed; frequently this group is associated with one of the others. The definite relationships of the second and third groups have not been scientifically proven, though presumptively are valid.

3. The symptomatic differentiation of the three groups has not been determined; the symptoms for the three groups, dependent upon the separation of the placenta, are identical; two extraneous findings may contribute to a strong presumptive diagnosis of the toxemic form—systemic signs of toxemia (albuminuria, increased blood pressure, blood chemistry), and a remarkable hardness of the uterus.

4. A tenseness of the uterine wall is not an invariable concomitant of ordinary ablatio, for it has been observed in only 20 per cent of 306 cases of ablatio reported. In ordinary ablatio, the consistency of the uterus may vary from rigidity to extreme flaccidity. It is strongly emphasized that tenseness is not a typical sign of ordinary ablatio.

5. Extreme rigidity of the uterine wall *may* be a pathognomonic sign of toxemic apoplexy.

6. A positive recognition of toxemic apoplexy is possible only by inspection of the uterus in life, or on the postmortem table.

7. Irrespective of the etiology, all cases of accidental hemorrhage may have the blood *absolutely concealed*, or *relatively concealed*; it is emphasized that symptomatically and clinically they are expressions of identical processes, the former being merely the precursor of the latter.

8. Absolute concealment merely means that mechanical hindrances preclude the escape of blood. When canalization takes place between uterus and placenta and membranes, then the blood appears externally; and have the relatively concealed type.

9. The one and only difference between the two above forms is the evidence of external hemorrhage; other than external hemorrhage, no symptom or symptom complex may appear in the one or be absent which may not be equally prominent or absent in the other.

10. Too often accidental hemorrhage is only diagnosticated when external bleeding appears, either promptly after the onset of trouble, or after many hours of absolute concealment. This delay in recognition is responsible for the higher death rate in absolute concealment over relatively concealed cases.

11. As emesis, faintness, loss of consciousness, abdominal discomfort to severe pain are the common early symptoms of ablatio, their occurrence, one or all, in a woman in advanced pregnancy should arouse the strongest suspicion of a possible premature detachment.

12. The symptom complex of eclampsia is markedly different from that of toxemic apoplexy. So far as we now know the pathologic findings in the liver alone show very many characteristic differences. The coincident attack of eclampsia and toxemic apoplexy strongly suggests that two intense poisons are liberated, producing diverse symptoms.

13. *Prompt recognition* of ablatio determines the happy outcome more than any particular method of delivery which may be elected.

14. Usually cases may be best treated by vaginal delivery; digital dilatation, version, rapid extraction (with firm fundal pressure), manual removal of the placenta, postpartum uterovaginal tamponade, secure the best results.

15. Cesarean section should be reserved for severe cases with a tight cervix, or for fulminating types.

16. The routine removal of the uterine in the toxemic types should be deprecated. Hysterectomy should be reserved for those uteri which do not retract, or for possible infection.

17. The mortality rates based on statistics compiled from the literature are too high. Early recognition of the condition with prompt delivery should reduce the mortality from 30 or 50 per cent to a normal rate of 5 or 10 per cent.

REFERENCES

- Ascoli: Zentrabl. f. Gynäk., 1902, xxvi, 1321. Baudelocque, J. L.: Les Art des Accouch, par. 1034. Berggren, S.: Arch. mens. d'obst. et de gynéc., 1912, ii, 49-59. Berkeley and Bonney: Difficulties and Emergencies of Obst. Prac., 1915. Accidental Hem., p. 244. Buc, V.: Am. J. Obst., 1894, xxx, 598. Cazeaux and Tarnier: Theory and Prac. of Obs., 1887, p. 749. Chevalier, M.: Jour. de Med., Chirurg. et Pharm., xxi, 363. Coale: Boston Med. and Surg. Jour., 1859, lix, 151. Couvelaire, A.: Ann. de gynéc. et d'obst., 1911, viii, 591. Idem: ibid. 1912, ix, 486. Cragin, E. B.: Pract. of Obst., 1916. Accidental Hemorrh., p. 576. Desmond, L. E.: Liverpool Med-Chirurg. Jour., 1857, i, 82. Dakin, W. R.: Handbook of Midw., 1897, Accidental Hemorrh., p. 338. Eden, T. W.: Manual of Midw., 1908, 2nd Ed., p. 358. Fehling: Zentralbl. f. Gynäk., 1887, xlix, 791. Galabin, A. L.: Manual of Midw., 1897, 4th Ed., Accidental Hemorrh., p. 434. Goodell, W.: Am. Jour. Obst., 1869, ii, 281. Harrar, J. A.: Bull. N. Y. Lying-in Hosp. 1917, xi, 3, 251. Heliier: Lancet, 1892, i, 799. Hennig: Arch. Gyn., 1875, viii, 359. Holmes, R. W.: Am. Jour. Obst., 1901, xlv, 753. Idem, Jour. Am. Med. Assn., 1908, li, 1845. Ingelby: Lancet, Jan. 11, 1840, p. 553. Jacquemier (Cazeaux and Tarnier): Theory and Prac. of Obst., 1887, p. 749. Kaltenbach u. Veit: Müller's Handbuch der Geb., ii, 86. Lee, R.: Clin. Midw., 1848, 2nd.

E. case 8, p. 183. *Ley, G.*: Proc. Royal Soc. Med. Obst. and Gyn., 1920, xiii-xiv. *Lehmann*: Rev. prat. d'obst. et de ped., May, 1899. *Levet*: (Mme. Boivin.) Hemorrhagies Internes p. 116. *Mesnard*: Le Guide des Accouch., 1873, p. 250. *Morse, A.*: Tr. Am. Gynec. Soc., 1919, xlv, 103. *Rigby*: An Essay on the Uterine Hemorrhages. 1822, 6th Ed. *Rokitansky*: Path. Anatomy. Sydenham Soc., ii, 347. *Schröder, K., Olshausen and Veit*: Lehrb. der Geb., 1899, 13th Ed., 751. *Tucker*: Med Record, 1898, li, 294. *Weiss*: Archiv. f. Gyn., 1894, xlv, 256. *Williams, J. W.*: Surg., Gynec. and Obst., 1915, xxi, 541. Idem: Obstetrics, 1917, 4th Ed., p. 876. *Willson, P.*: Surg., Gynec. and Obst., 1922, xxxiv, 57. *Wilson, E.*: Personal Case Report in Goodell's paper: case 100. *Winter*: Ztschr. f. Geburtsh. u. Gynäk., 1884, xi, 356.

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(For discussion see page 623.)

SOME OBSERVATIONS ON PLACENTAL INFARCTS*

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THE name "infaret" as applied to the human placenta has been rather loosely used to cover a large group of degenerative processes of unknown origin. In general the name is applied to well defined areas of whitish, yellow, or red color as well as more extensive degenerative processes in the interior or on either the fetal or maternal surface of the placenta. Whether all these morphologic changes are produced by the same process, and whether or not they are due to a single or a multitude of causes has not been definitely determined. The name implies that the condition arises from circulatory derangement such as embolism or thrombosis. Whether or not these conditions have such a causation still remains in doubt.

In order to have a clear understanding of the possible etiology it is necessary to have a proper grasp of the placental circulation. The placenta is a rapidly developed organ arising from the chorion frondosum which early becomes differentiated from the chorion laeve. In the early weeks we have the vitelline circulation which is later replaced by the established fetal circulation through which the blood is carried to and from the placenta, making a complete arteriovenous circuit with a capillary system having afferent and efferent vessels to and from the chorionic villi. The villi, originally rather simple finger-like processes, become extremely complicated arborescent masses which have a much more complicated circulation than the primary villi. The placenta is not only a rapidly developed but a very large and complicated structure, being exceeded in size as well as intricacy by very few organs in the maternal body, to say nothing of those in the fetus. The placenta is unlike any other organ in the human body in its circulatory arrangement, which is bipartite, the fetal circulation on the one side and the maternal on the other. The only organ in the human body to which it might be compared is the

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liver with its portal circulation on the one hand, and the hepatic on the other. The relationship of these two circulations was long clouded in obscurity, and the maternal circulation of the placenta has only within recent years been definitely understood. It is well established that the two are independent so far as direct fluid and cellular interchange is concerned. The maternal circulation reaches the placenta through the curling arteries of the uterus, communicates with the marginal sinus of the placenta, the blood enters the intervillous spaces, and bathes the villi. This large amount of blood which lies in the intervillous spaces and the marginal sinus ultimately returns to the systemic maternal circulation through specially developed veins in the uterus. It would be very easy to have degenerative processes arise in the placenta through any disturbance of either one of these two circulations. On the fetal side embolism or disease of the arterial or venous walls might easily result in tissue necrosis. On the maternal side congestion, either active or passive, or thrombosis might well result in the death of placental tissue. It goes without saying that rupture of either fetal vessels or maternal sinuses with resultant hemorrhage in the tissues might produce degenerative processes in the tissues. These changes in the placenta might then develop as a result of trophic disturbances arising, incidentally to the rapid growth and development of the placenta, from circulatory disturbance coming about through anything affecting the lumina of the vessels, the walls of the vessels, or pressing on the walls of the vessels from without, which might result in the death of the highly differentiated placental tissue. This degenerative process might also be the result of the action of toxic material circulating in either fetal or maternal blood. Attempts have been made to associate these degenerative conditions with toxemias of pregnancy and nephritis. Granting that these changes are associated with toxemias of pregnancy it remains an open question as to whether they are an etiologic factor in producing these toxic disturbances or simply the result of the toxins circulating in the blood. If the former supposition is correct, we are still in the dark as to what produces the placental changes. If the latter is correct, we still have no explanation of the origin of these toxemias. If these degenerative conditions in the placenta are to be regarded as the cause of eclampsia, they should be constantly present and associated with the disease unless there is some antecedent condition in the placenta which has been overlooked and ultimately leads to the formation of these degenerative changes. If these conditions are the result of pregnancy toxemia, they need not, of course, be constantly present but would be rather frequently associated with the condition. It is possible, of course, that the same condition which produces the toxemia in the mother with degenerative changes in

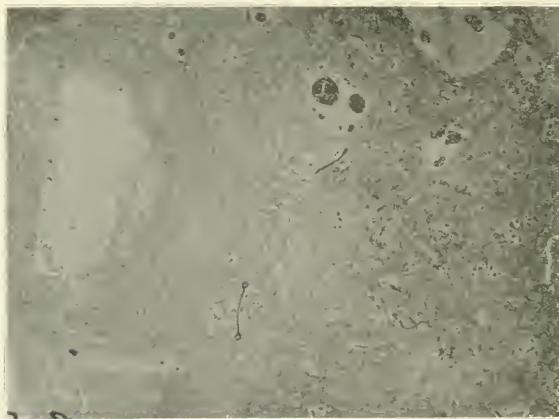


Fig. 1-A.

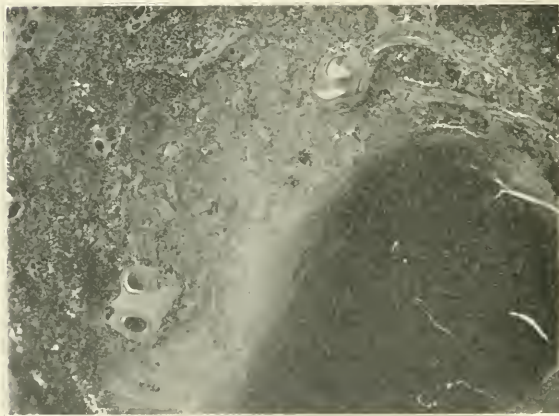


Fig. 1-B.

Fig. 1.—Fulminant case of eclampsia with convulsions. Placenta showed old white infarcts and recent hemorrhages. *A*, Photomicrograph showing old area of degeneration. *B*, circumscribed hemorrhage, diffuse hemorrhages and marked congestion.

her organs, which also affects the fetus even to causing its death, might also affect the placenta which is the intermediary organ between these two living organisms. The occurrence of the placental changes could be explained consistently with either the fetal or maternal origin of these toxemias.

With these introductory remarks we will pass to a more definite consideration of the so-called placental infarcts.

In von Winckel's *Handbuch* (1906) they are described as nodes or layers of fibrin which occur frequently in the placenta, sometimes as amorphous, homogeneous layers. They are especially apt to occur where fibrin may be formed, as on the surface of the decidua basalis and septa placentae. They are absent at the opening of the blood vessels and in the intervillous spaces. Thin layers of fibrin occur on the outer surface of the chorionic membrane, especially near the periphery of the placenta. Irregular strips or masses involving the tips of a large or small number of villi in the middle of the placenta are to be found. The source of the fibrin is thought to be from the decidua. This author states that he has seen endothelium lying over the layers of fibrin on the basalis. He considers possible a similar decidual origin in the septa of the placenta. He thinks it is not to be denied that occasional blood clots occur in the intervillous spaces which result in fibrin formation. Langhans' school thinks that the basis of the fibrin formation is from the inner layer of the epithelium of the chorionic villi. Minot considers that the basis of the fibrin formation is the villous syncytium.

Aschoff (*Pathologische Anatomie*, 1913) states that these infarcts are the most frequent change in the placenta and are the result of some circulatory disturbance. They usually appear as yellowish white areas in the basal layer and extend a greater or less distance into the placental tissue. They also occur less frequently as subchorionic masses. The microscopic appearance is that of densely compressed and fused villi which make up the white infarct, or there may be a mass of clotted blood surrounded by a capsule. The conditions result from a disturbance of the intervillous circulation which deprives the villi of their surrounding blood, or there may be a sudden outpouring of blood into these spaces which separates the placental tissue leaving a shell of surrounding tissue. These changes may result from destruction or injury to the maternal vessels, either arteries or veins, by the ingrowth of fetal cells.

Frankl, in Liepmann's *Handbuch der Frauenheilkunde* (1914), describes infarcts as yellowish masses of varying sizes, occurring on the fetal or maternal surfaces of the placenta. They are more frequently located near the margin of the placenta. Small ones occur frequently, but the larger ones are to be regarded as pathologic. They are relatively frequent in lues and nephritis. They are often found when there is no illness in the mother. The microscopic picture shows the degenerated stroma of villi which have lost their epithelium. There are masses of fibrin in the intervillous spaces and the villi are matted together. He agrees with Hirschmann and Lindenthal that the destruction of the villous epithelium leads to fibrin formation which results in the degeneration of the villi and their stroma giving rise to infarct formation.

Sarway, in Döderlein's *Handbuch* (1915), states that these infarcts are frequently found in placental tissue as changes with fibrin formation which result from coagulation necrosis. These areas are bright yellow or white, round or oval, sometimes several centimeters in diameter. They may be more or less indurated. There may be flattened or nodular areas, sometimes wedge shaped, located on either the fetal or the maternal surface of the placenta, usually not lying deeply in the placental tissue. Islands may occur in the middle of the placenta which have been designated as infarcts by Ackermann. The site of preference for the infarct is at the margin of the placenta. According to Seitz the origin of infarcts is not uniform and is thought to result from inflammatory processes in the decidua, the chorionic epithelium or chorionic vessels. They may also result from other pathologic conditions. Macroscopic infarcts were found by Steffek in one-

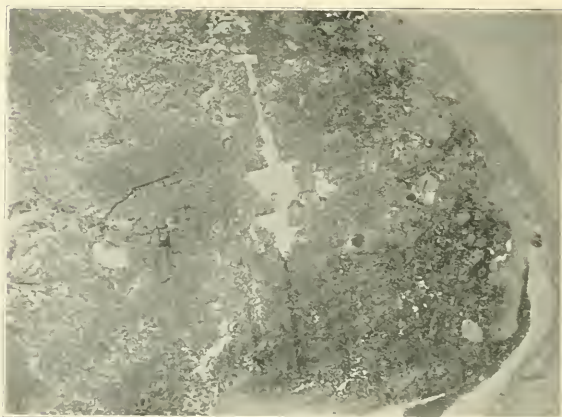


Fig. 2-A.



Fig. 2-B.

Fig. 2.—No sign of toxemia. Twin pregnancy. One twin died about fifth month of gestation and was delivered as fetus compressus. Other twin delivered alive at term. A, Photomicrograph of area in placenta of normal living twin. Marked congestion near margin. B, Photomicrograph of placenta from fetus compressus. Marked degeneration with extreme vascular changes.

half of all cases; by Williams in nearly 64 per cent of all cases. These authors agree with Hirschmann and Lindenthal that microscopic infarcts appear in practically all placentae. Bumm thinks that the origin is from stagnation of maternal blood in the intervillous spaces, the formation of a blood clot with resulting necrosis of the surrounding villi and decidual masses. Sarway thinks that

the peripheral infarct should not be confused with the placenta marginata or circumvallata. While these processes are to be regarded as pathologic, they are not inconsistent with the life and health of mother and fetus unless very extensive, when this condition may result in fetal death.

Frank (*Obstetrical and Gynecological Pathology*, 1922) states that these infarcts are whitish or yellowish in color, varying in size and shape (round, oval or wedge shaped, a few millimeters in diameter or occupying one-eighth to one-fourth of the placenta). They are of frequent occurrence and appear on both fetal and maternal surfaces. They are firm, avascular, sometimes retracted below the general surface level. They are of no importance unless they cover a large area or are numerous. They may lead to faulty nutrition and death of the fetus. He states that they are often associated with nephritis and syphilis, but are not to be considered as pathognomonic of any disease. Microscopically, they show degeneration of the villi with fibrin formation. The villi at first appear swollen, the vessels are obliterated but the epithelial covering seems to be well preserved. Later the villi become ill-defined shadows, without definition or cellular covering, lying amid fibrillar, hyalin or granular fibrin. The causes may be either an endarteritis of the fetal vessels, or a thrombosis in the intervillous space which is probably due to destruction of the chorionic epithelium.

The above expressions of opinion from well-known sources indicate that opinions are not fully crystallized regarding the origin and significance of these so-called infarcts.

There are a number of things to consider in reference to the causation of these localized degenerative changes. One can group the theories regarding the etiology into those which place the factors on the maternal side, and those which locate them on the fetal side. Among different possible underlying maternal conditions may be mentioned (1) vascular changes including thrombosis, (2) hemorrhages into the intervillous spaces, (3) degeneration of decidual areas. These conditions are supposed to occur as retrogressive changes resulting from senility of the organ, various infections, acute or chronic, as syphilis or toxic conditions resulting from nephritis and eclampsia. The fetal tissue changes which are held responsible for these infarcts are (1) vascular changes, as periarteritis, endarteritis, and thrombosis, (2) stroma changes in the villi, (3) cellular changes involving the fetal ectoderm or chorionic epithelium. The last mentioned changes may be considered to arise directly from changes on the fetal side or indirectly from changes in the decidua, some interference with the intervillous circulation or as the result of deleterious matter occurring in the maternal circulation. We have further to consider the relationship of different localized degenerative processes to one another. They occur in various locations in the placenta and we have varying gross and microscopic appearances. It is very important to know if these degenerations are all a part of the same pathologic picture and whether or not the same fundamental cause is responsible for the occurrence of these apparently different conditions.

Cruveilhier believed that the various conditions seen were parts of the same process in that he could trace the transition from the red to white infarcts. In his opinion the underlying cause was maternal, due to an atrophy resulting from a

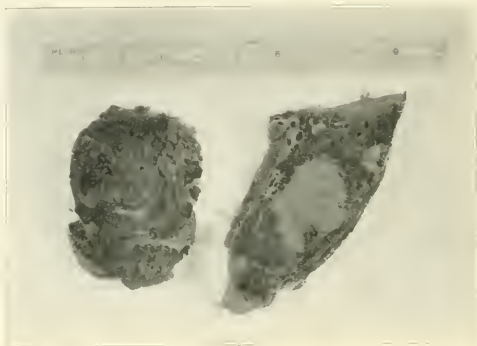


Fig. 3-A.

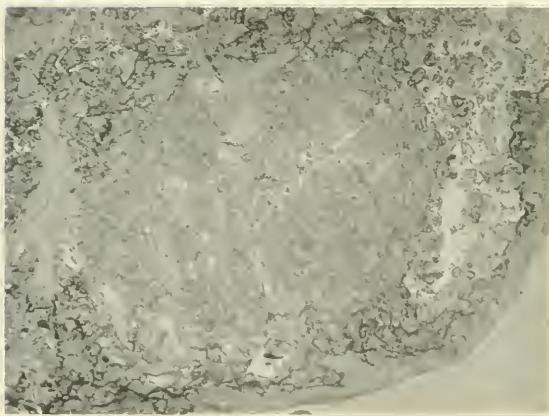


Fig. 3-B.

Fig. 3.—Case with marked pre-clamptic symptoms. Placenta showed areas of softening and also red and white infarcts. *A*, Cross sections showing a white infarct and a red infarct which has become encapsulated. *B*, Photomicrograph of a white infarct with vascular changes.

laceration of the maternal vessels, resulting from a localized separation of the placenta from its decidua. Others accepted his views.

Branchet advanced the theory of an inflammatory exudate. This idea was accepted by others, and Scanzoni applied the term hepatization to some of these placental changes.

Rohr thought thickening of certain maternal vessels with thrombosis was responsible for these infarcts.

Steffeck attributed the primary origin of all infarcts to decidual changes.

Young accepts interference with the maternal circulation on either arterial or venous side as the causation of placental infarction. He considers that the red



Fig. 4.—Case with marked preeclamptic symptoms. Placenta showed numerous white infarcts varying in size and location. Some infarcts with brownish centers and some red infarcts. Cross sections of some of these infarcts showing apparent transitional stages from red to white.

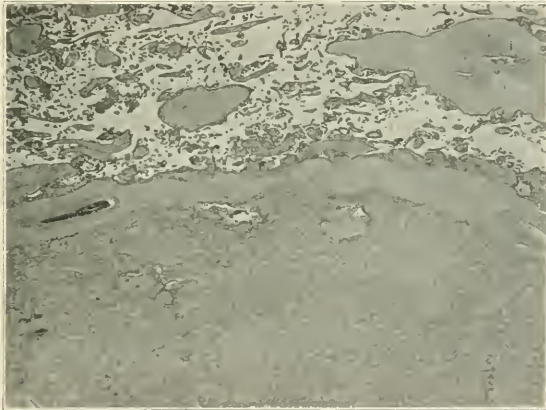


Fig. 5.—Normal pregnancy. No signs of toxemia. Placenta showed degenerative changes with white infarcts. Photomicrograph showing vascular changes and a white infarct made up of degenerated villi and definitely bounded by a fibro-vascular septum.

and white infarcts are steps to the same process. He further believes that the autolytic changes set up by this death of placental tissue are responsible for eclampsia, and he bases a theory of etiology for eclampsia on his observations. Franke accepts maternal vascular changes as a causative factor in placental infarcts, and considers necrosis of the decidua to be a causative factor. It is his belief that the different appearances are differences of degree as well as different stages, and that all have the same underlying causes.

Robin was an early champion of the fetal origin of these infarcts and attributed them to a fibrosis of the villi with associated fatty changes. Barnes also considered the condition to be one of fatty degeneration.

Ackermann and Hoffman were perhaps the first to enunciate clearly the theory of fetal vascular changes. At first they stressed the periarteritis of the fetal vessels; this results in some coagulation necrosis of the villi which in turn sets free certain substances which cause changes in the surrounding maternal blood, resulting in coagulation in the intervillous spaces with ultimate fibrin formation which brings about matting together of the villi.

Spaeth and Wedl, also Langhans, have emphasized fibrin formation as the important factor in infarct formation.

Later Ackermann was led to alter his previous theory and placed more emphasis on endarteritis than periarteritis of the fetal vessels, and changed his viewpoint regarding the importance of the coagulation of the maternal blood to one in favor of cell necrosis with hyaline and fibrinous formation. This view has been accepted by others, and Williams elaborated and corroborated the importance of endarteritis of the fetal vessels in relation to the formation of these white infarcts. He stated that "the vast majority of infarcts, wherever situated, are fetal in origin, and their only maternal constituent is the fibrin, which has resulted from the coagulation of the blood in the intervillous spaces."

Hitschmann considered that alteration and loss of chorionic epithelium, which usually occurs in the last weeks of pregnancy, cause fibrin deposits and infarct formation. It is possible that the vascular changes resulting from such toxic conditions as nephritis and eclampsia may also affect the placental blood vessels with the production of infarcts and hemorrhages.

Kussaner in a study of cysts on the fetal surface of the placenta thought he could trace some relationship between these cysts and white infarcts and they might be considered to be the result of central necrosis with liquefaction of the circumscribed degenerative areas.

The theory that infection and inflammatory processes are responsible for the presence of infarcts has been advocated by Favre and others. This idea has not been very widely accepted. A few men have made cultures from these infarcts with negative results. In only a small minority of the cases do we find definite evidence of active inflammatory processes. While these processes may be a factor in the causation of a few of these degenerative changes, it could hardly be accepted as a general cause for placental infarcts.

It is, therefore, evident that there is considerable diversity of opinion regarding both the etiology and significance of placental infarcts. One very important question to decide is whether or not they are an etiologic factor in the toxemias of pregnancy.

Young is one of the most recent ardent advocates of the theory that local autolytic changes in the placenta are responsible for the existence of pregnancy toxemia. If the placenta is retained sufficiently long following these changes, infarct formation will, in his opinion, result. There are a number of difficulties in the way of the unqualified acceptance of this theory. (1) It is quite apparent that old white infarcts cannot be responsible for toxemia. One frequently observes these white infarcts in cases who have presented no signs

of toxemia of pregnancy. It must be some recent change in the placenta which is responsible for the development of toxins. (2) Admitting the truth of the assertion that these infarcts are much

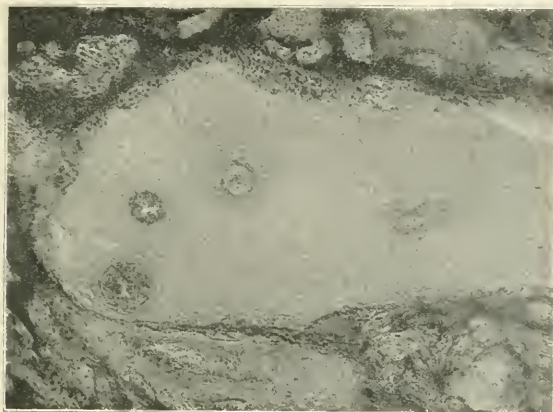


Fig. 6-A.

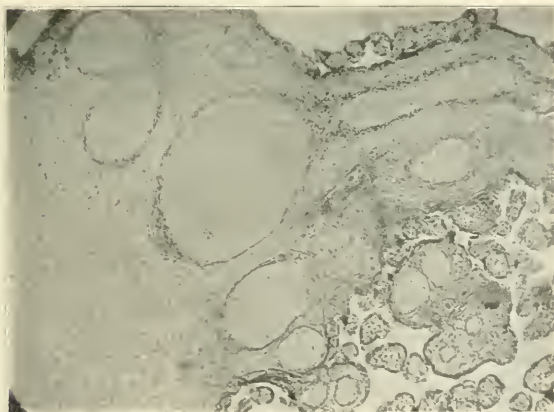


Fig. 6-B.

Fig. 6.—Normal pregnancy with no signs of toxemia. Placenta showed marked evidence of degeneration. There was a rather large necrotic area surrounded by fibrous tissue. *A*, Photomicrograph from markedly degenerated area showing the blood vessels. *B*, Photomicrograph showing vessels from normal area in this placenta.

more frequent in toxic cases. they still do not seem to be limited to cases presenting a true eclamptic toxemia. (3) It is difficult to

demonstrate gross and microscopic changes in all placentae from cases of toxemia, and while both old and recently degenerated processes are often present, there are a considerable number of normal placentae from these cases which cannot be differentiated from placentae delivered from cases which are apparently normal. (4) One quite frequently finds changes in placentae from cases who present no clinical signs of toxemia in which changes which are both macroscopically and microscopically like those seen in the placentae from toxic cases. These arguments would seem to point toward placental changes as resultant and concomitant conditions rather than fundamental etiologic factors in the causation of pregnancy toxemia.

Whether or not we accept the idea that these localized degenerations in the placenta produce toxins which, when absorbed, give rise to pathologic conditions in the mother, we are, nevertheless, not in a position to recognize that all of these processes are not necessarily

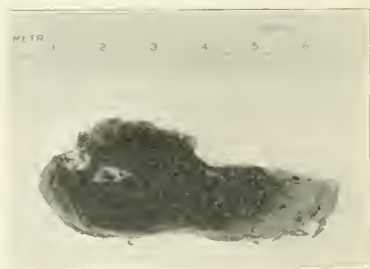


Fig. 7-A.

Fig. 7.—No signs of toxemia. Placenta showed interstitial red or hemorrhagic infarcts. A, Cross section through a large red infarct near the margin of the placenta. B, Photomicrograph showing a hemorrhagic area surrounded by fibrin, decidua, and degenerated villi. There are also large areas of compact villi showing fairly normal villi sharply demarcated from degenerated villi. C, Large hemorrhagic area with evidence of old and recent hemorrhage; a large fibrin deposit. Scattered villi are found in these areas.

due to the same factors. On the one hand, to accept Young's theory is not inconsistent with the proposition that anything which causes recent destruction of placental tissue could be an indirect cause of the toxemia. If, on the other hand, we do not accept his theory, we are quite justified in believing that these processes may result from any one of a number of different conditions, of which the eclamptic toxemia is one.

We are also confronted with the necessity of deciding whether all localized degenerative processes in the placenta are the result of the same primary change, or whether they have different underlying factors. The diversity of views among different observers regarding the fundamental change back of infarcts is in itself an argument for

the opinion that there are different underlying factors. Williams, I believe, now recognizes that fetal endarteritis is not the sole underlying cause of placental infarcts.

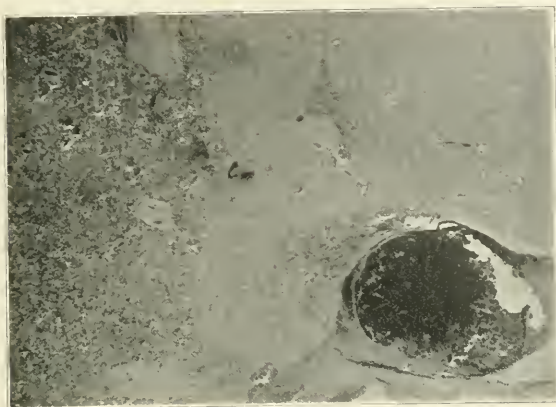


Fig. 7-B.

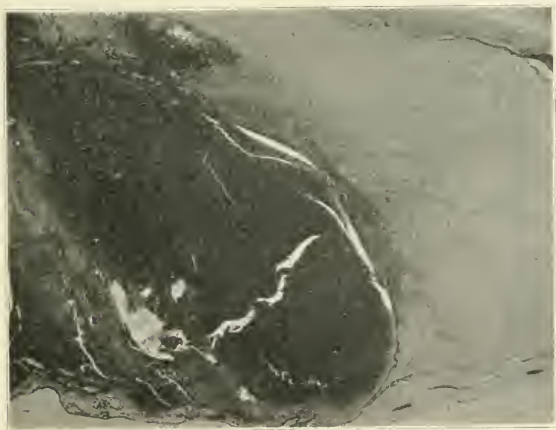


Fig. 7-C.

Relative to the different types of local changes in the placenta one might believe, with reference to white infarcts, that they (1) all are the end result of the same process, or (2) that they are the end result of different processes. In a broader way one might state that

all localized degenerative changes in the placenta may represent (1) different stages in the same process, or (2) separate and distinct processes.

It is obvious that white infarcts do not occur ready made, and that they must go through some process of formation or development. One might, therefore, expect to find in the same placenta and in different placentae the presence of conditions which would ultimately lead to the formation of white infarcts. If one recognizes that we do find in placentae local processes of different gross and microscopic appearance, one is inclined to speculate as to how many of these different processes would ultimately lead to the formation of white infarcts. Both the character and frequency of white infarcts would indicate that it is a terminal stage of some one process or of a number of changes which have preceded it.

One of the most striking changes which we see in the placentae are the so-called red infarcts or localized hemorrhagic areas. This leads us to inquire as to the ultimate fate of these areas of degeneration. If there are no subsequent changes in these areas one must conclude either (1) that they represent a stationary process, or (2) that the placentae are all expelled before any subsequent changes take place. If neither one of these suppositions is true, we must find something in the placenta which represents a later stage in this process. The accuracy of either one of the above conclusions is highly improbable.

What are then these transitional stages, and what is the final stage of retrogression, if any such stage or step is reached? One sees both gross and microscopic areas of hemorrhage which indicate the taking place of gradual changes as shown by fibrin formation, encapsulation, change in color, and even areas of fibrinous and fibrous tissue containing old blood pigment with a central area having the appearance of old hemorrhage. It is not rare to see areas which have the appearance of successive processes as though there had been one small hemorrhagic area formed after another. It is not at all inconsistent or improbable to think that these hemorrhagic areas which have developed a sufficient length of time before the expulsion of the placenta may have become what we are pleased to call, white infarcts.

We might then state two probable conclusions: (1) That where we have fibrinous or fibrous tissue in fairly homogeneous masses, we are dealing with the terminal stage of a degenerative process; (2) where there are fresh hemorrhages or localized accumulations of blood, we are probably dealing with the beginning of some pathologic process.

Unfortunately, these factors do not seem to account for all the beginnings or endings seen in these localized degenerative areas. There

are certain white infarcts which seem to be made up of quite solid masses of markedly degenerated villi, firmly matted together. They appear merely as shadows of their former selves, but still the shadows are distinct enough to enable one to recognize them as former villi. This might well be the terminal process, of which one sees the beginning in sharply demarcated areas where fairly well preserved villi may be seen in a rather compact mass, but showing some beginning of degeneration. It is not infrequent to see fibrinous and fibrous masses in decidual areas. One might easily be led to believe that the fresh hemorrhages which one sees in decidual areas represent the beginning of such a process. Other areas are seen presenting marked congestion of the villi and intervillous spaces. These areas are often quite well localized. As an advanced stage in this process, one sees well defined areas where there are numerous degenerated villi surrounded by marked fibrin deposits in the intervillous spaces.

It is not infrequent to find definite vascular changes in these placentae, both endarteritis and periarteritis. Some marked vascular changes appear to be secondary, others might well be primary changes. In some cases vascular changes are not demonstrable.

Thrombosis of the vessels is occasionally seen, but is not frequent enough to account for all of the degeneration which is found in the placentae. Marked congestion and hemorrhagic areas are frequently seen. These may occur on the fetal surface, on the maternal surface, in the decidua or interstitial portion of the placenta. All of the hemorrhages which I have seen are apparently of maternal blood. In a few one sees definite evidence of localized inflammatory processes accompanying these degenerative processes. These have usually been on the maternal surface of the placenta.

In conclusion one seems justified in stating:

1. That all white infarcts do not fit into the same category, and probably result from a number of different processes.

2. The most of these localized degenerative processes which are grouped under the name of placental infarcts might all lead to the formation of white infarcts if a sufficient length of time elapsed between the time of their occurrence and the delivery of the placenta.

3. A number of causes operate to produce these localized areas of degeneration in the placenta, among which may be mentioned vascular changes such as endarteritis, periarteritis, and thrombosis, localized hemorrhages which may result from static, traumatic, or toxic conditions.

4. Disturbances of the afferent blood supply may be responsible for atrophic conditions resulting in degeneration of the areas supplied by these vessels.

5. Infection and inflammatory processes may play a rôle in the causation of some of these degenerations.

BIBLIOGRAPHY

Ackermann: Virchow's Arch. f. path. Anat., 1884, xvi. *Ackermann*: Virchow Festschrift, 1891. *Aschoff*: Pathologische Anatomie, 1913. *Brachet*: Jour. gén. de méd., chir. et pharm., Paris, 1828, cii. *Bumm*: Grundriss der Geburtshilfe, 1921. *Cruveilhier*: Anat. path. du corps humain, 1829-1835, i, 16. *Favre*: Virchow's Arch. f. path. Anat., 1890, cxx. *Francke*: Path. Anat. Arbeit., 1903. *Frank*: Gynecological & Obstetrical Pathology, 1922. *Frankl*: Liepmann Handb. der Frauenheilkunde, 1914, ii. *Hitschmann and Lindenthal*: Archiv. f. Gynäk., 1903, lxi. *Hoffman*: Inaug. Dissert. Halle, 1882. *Robin*: Arch. Gén. de Méd., 1854, i. *Rohr*: Virchow's Arch. f. path. Anat., 1899, cxv. *Sorway*: Döderlein's Handbk. d. Geburtshilfe, i. *Scanzoni*: Lehrbuch d. Geburtshilfe, 1853, ii. *Spath & Wedl*: Braun, Klinik der Geb. & Gyn., 1855. *Steffek*: Hofmeier's Die Placenta, 1890. *Williams*: Johns Hopkins Hosp. Reports, 1900, ix. *Williams*: Obstetrics, 1920. *von Winckel*: Handbk. der Geburtshilfe, 1903, i. *Young*: Proc. Roy. Soc. Med. (Sect. Obs. & Gyn.), 1914.

730 LASALLE BUILDING.

(For discussion see page 623.)

THE TREND OF MODERN OBSTETRICS—WHAT IS THE DANGER? HOW CAN IT BE CHANGED?*

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AT the present day, Nature no longer dominates the practice of obstetrics. The modern obstetrician no longer patiently awaits her pleasure, assisting only when it becomes evident that help is necessary. Today, on the slightest provocation and often on decidedly uncertain grounds, he takes matters into his own hands. He is not content even to await the onset of labor, but takes steps to induce it at the time when he believes the process should occur. After the cervix has become dilated, or when it is easily dilatable, he turns the child *in utero*, and delivers it feet first, or if the head of the child has reached the perineal floor, he completes delivery at once by means of episiotomy and the aid of forceps. If a case promises to be difficult, he ignores the natural channel of expulsion and delivers the child through an abdominal incision.

What excuse does he give for thus interfering with the normal process of labor? He aims to alleviate the agony of labor, to shorten for the expectant mother the tedious hours of suffering, and incidentally to end the suspense and uncertainty as to when labor will begin. Such methods have become so prevalent that it has become necessary that we insist upon knowing whether the claims of their advocates are well founded.

Unfortunately, the average woman accepts the situation with

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eagerness. She sees only the promised relief from pain, and never considers whether there is increased danger to herself or to her offspring, taking it for granted that such is not the case.

To a certain type of woman, fortunately rare, the fate of the child is a secondary matter so long as she herself is released from suffering. The overwhelming majority of expectant mothers, however, would at once reject any procedure that increased the risk to the infant. How quickly they would appreciate the futility of shortening the second stage of labor did they but know that the most severe pains of labor and those most difficult to control occur during the first stage, when version and forceps are of no avail; and that in the second stage, with the constant and efficient aid of the accoucheur, anesthetics may be so administered as to almost nullify the distress of labor. Indeed, she may well inquire whether these various practices do more than merely bring on labor at a convenient time, and shorten its duration by an operative procedure for which full and complete anesthetization is necessary.

Let us suppose that the patient now definitely asks the cost. How do these methods of procedure influence the subsequent condition of the mother and affect the fate of the child? What have the chief exponents of these "labor-saving" plans reported in the way of maternal and fetal mortality?

Reed, who induces labor at the estimated term, by means of a tube or a bag in order to prevent oversize and disproportion between the child and the pelvis, reported a maternal mortality of 1 per cent and a fetal mortality of 6 per cent in 200 cases. Watson, who induces labor by administering castor oil and pituitrin, in 195 cases had no maternal mortality but had a fetal mortality of 6 per cent.

It is not always easy to induce the uterine muscle to expel the fetus before the allotted time. All methods of inducing labor are accompanied with certain dangers from which they cannot be dissociated. No matter how careful the technic or how skillful the obstetrician, infection, separation of the placenta, prolapse of the cord, and death of the child from the injection of pituitary substance loom large as grave dangers.

The method of shortening the second stage of labor as a routine procedure by the performance of version is an astonishing proposition, to say the least, especially when no abnormalities are present and Nature gives promise to deliver the patient in due time. For years breech presentations have been regarded as increasing the risk to both child and mother. At first thought it would seem that such a plan as routine version would be rejected as preposterous, and nothing but the skill and dexterity of the advocate of this method, who has been able, by virtue of his unusual gifts, to impress his onlookers,

would tend to lead the medical profession to consider seriously so remarkable a plan of treatment. It is not surprising, though, that even in the hands of the originator of routine version the fetal mortality should be high.

Potter's first report for the year ending August 31, 1920, gave a fetal mortality of 6.7 per cent. A striking fact in this report is that 12 children who were born alive, died with convulsions during the first thirty-six to seventy-two hours. The following year's report ending August 31, 1921, given in his book ("Version," Mosby, 1922), is not entirely clear, but he admits for version as an obstetric procedure a fetal mortality of 2.3 per cent. In addition, it may be noted that in 1,130 cases he had 4 craniotomies and 100 cesarean sections. The unkind critic might add that in difficult or abnormal cases, when possible, he had elected to employ the abdominal route.

When we consider the proposition of De Lee, we are impressed, from the very beginning, with the fact that here there is actually debatable ground, and that we must not, even for a moment, compare the prophylactic use of forceps after an episiotomy with either Reed's or Potter's proposals. Indeed, there is some justification in the advocacy of forceps used prophylactically, and yet, after weighing the matter carefully, even here one must decide that interference in a normal case as a routine measure is unwise, and that both the mother and the child will do better if Nature is permitted to take its course. De Lee, at present, furnishes no statistics, so far as we know. His last report gave a gross fetal mortality of 3.6 per cent in 9,258 cases, but assuredly these cases were not all treated prophylactically with forceps.

As compared to a difficult forceps or version operation, cesarean section is a simple operative procedure, but we agree with Holmes that it is a grave mistake to believe that cesarean section is accompanied with less danger than is attendant on what may be termed a tolerably difficult forceps or version delivery. No one will deny that in difficult cases a larger proportion of living babies are secured by this method, but there often follows a certain morbidity that remains with the woman throughout her life.

If a young woman were asked to decide between a cesarean section and a living child, and a difficult labor with the risk of losing the infant, she would be wise to choose the latter method. A young woman may lose her first baby, and yet may later bear numerous other children. In fact, in the writer's experience, difficult first labors are not uncommon in healthy young women due to rigidity of the soft parts alone, and while the first labor may be prolonged and tedious, and in *exceptional* cases the infants may perish, subsequent pregnancies may terminate normally and easily. Being assured of this fact, how much more complacently would the woman look forward to a

natural birth than to a second abdominal operation? There is considerable truth in the epigram, "Once a cesarean, always a cesarean."

What about the dangers of interference with the natural processes of labor? Is not the risk to both mother and child increased materially? Holmes, three or four years ago, declared that, in spite of the introduction of aseptic methods, the mortality rate in obstetrics had not been lowered, whereas in all other branches of surgery antiseptics and anesthetics had markedly reduced the mortality. As a reason for this, he pointed to the unjustifiable interference with Nature's process of delivery.

Ehrenfest has called our attention to the fact that in at least 40 per cent of all properly performed autopsies on stillborn infants and those dying within the first few days after birth, intracranial traumatic lesions of some kind are discovered. Although it is true that such traumatisms have been known to follow spontaneous labor, in by far the larger number of instances severe traumata are observed to follow delivery by artificial means, or by the use of instruments. "However," says Ehrenfest, "careful consideration of the various mechanical factors directly responsible for the traumatization of the child would seem to lead to the inevitable deduction that a higher incidence of injuries must be looked for, if the teachings of some of our ultramodern obstetricians should prevail. No amount of personal technical skill, unavoidably acquired at the cost of many fetal lives, in my belief, could neutralize the augmented risks to the child of a routine version, followed by immediate extraction, of forceps extractions seriously recommended even on the high head for the sole purpose of shortening the suffering of the parturient woman, or made necessary by the elimination of important accessory expulsive force in twilight sleep. No personal effort of the accoucheur could obviate the dangers of a sudden and excessive compression of the fetal head quickly forced through an unyielding birth channel by a large dose of pituitrin."

"Most clearly," this observer declares, "it has become the duty of those who advocate the artificial termination of labor under general anesthesia in order to overcome the unquestionably slower and more painful process of spontaneous delivery, to prove that such methods do not imply a greater immediate and later risk to the life and health of the infant."

Eden also declares himself against routine interference, and asserts that "one of the first principles in the conduct of labor is non-interference. We are passing now," he says, "through a phase of meddlesome midwifery which should be viewed with great concern. Operative delivery should not be resorted to unless absolutely necessary."

What, then, may we expect the fetal mortality to be in conservatively conducted labor, and how does it compare with the results of the routine methods employed at present? If we read the report on the midwife by Nicholson, we find that in 51,693 certified deliveries in the city of Philadelphia, there was a fetal mortality of $2\frac{1}{2}$ per cent, and a maternal mortality of $\frac{1}{8}$ of 1 per cent. From this it might appear that the modern obstetrician is a distinct menace to the community. The truth of the matter, however, is that the obstetrician is able to beat these figures, which look better than they really are, for obvious reasons, when he adheres strictly to asepsis and pursues a rational policy. This is shown by the excellent report of Polak, whose fetal mortality in 12,000 consecutive cases was 2.5 per cent, and by the admirable work of Beek, who wrote on the subject, "Is Interference Justifiable After Twenty-Four Hours of Labor When No Other Indication Is Present?" In the latter's series there were 1,138 prolonged labors: spontaneous deliveries were effected in 1,125, and the total infant mortality up to two weeks was 3 per cent. We would recommend a careful perusal of Beek's paper to all those who routinely interfere with labor on the plea of lowering mortality and morbidity for both mother and child. Let us draw particular attention to his closing words: "Our only conclusion, therefore, against the routine advocated in this paper is that it calls for considerable courage and is accompanied with considerable worry on the part of the attending obstetrician."

Statistics must, of course, be carefully scrutinized before we accept them at their face value, and in the determination of the fetal mortality as influenced by the methods employed in delivery, we should exclude the fetal deaths which, beyond any reasonable doubt, are due to causes other than the methods employed. Potter, in his book ("Version," Mosby, 1922), has attempted to do this, for he states definitely that version has a mortality of 2.3 per cent. In arriving at that conclusion it appears that he has excluded all those fetal deaths that may be designated as unavoidable and as entirely independent of the method of delivery employed. As illustrative of this, the same purpose is evident in the statement of Danforth, an advocate of conservative treatment; he reports 500 clinic and private cases, showing a gross infant mortality of 3.6 per cent, and a corrected fetal mortality of 1.14 per cent. The importance of making this distinction is shown in a series of 400 consecutive private cases of our own. Every private case from the very beginning of practice down to the present time, has been included, the last of the 400 being delivered May 4, 1923. These cases, be it clearly understood, were cared for from the beginning to the end of pregnancy, and were not those seen in consultation after labor had begun, nor those seen for the

first time within the last three weeks of pregnancy; there were no clinic cases; and none was delivered prematurely—that is, more than three weeks from estimated term. In this series of 400 cases there were nine fetal deaths—a fetal mortality of 2.25 per cent—and no maternal deaths.

Six of the deaths could not be attributed to the method of delivery—they would have occurred regardless of the technic employed, and should, therefore, be excluded, since they were unavoidable. The reader is requested to review them critically.

CASE 1.—Small, undersized twin—other one living and well; no difficulty in delivery; born alive, but died of inanition within twelve hours.

CASE 2.—Child was dead before labor started; placental apoplexy; eclampsia; accidental hemorrhage; normal labor.

CASE 3.—Child died just before or early in labor; mother missed movement; no heart sounds, although heard plainly the day before; labor was normal and lasted fourteen hours; membranes ruptured after head was on the perineum and the amniotic sac was distending the vulvar outlet; child normal in appearance; autopsy and Wassermann negative. Only explanation is accidental compression of the cord.

CASE 4.—Child died within twenty-four hours of birth; congenital heart disease (autopsy); normal labor.

CASE 5.—Child died within twenty-four hours; hydrocephalus and infant idiotic in appearance; normal labor.

CASE 6.—Child died on fifth day from pneumonia; multipara; normal, spontaneous labor—six hours. Autopsy and Wassermann negative, except for pneumonia.

In the judgment of the reader, should not these cases be classed as unavoidable deaths, independent of any method of delivery?

There were 3 deaths that we may consider as avoidable and directly concerned with the method of delivery.

CASE 1.—Central placenta previa; young woman; first baby; version; this was done deliberately to save the mother, but a cesarean section would probably have saved both mother and child.

CASE 2.—Death within twenty-four hours of labor; multipara, forty-two years old; high forceps; occipitoposterior position; cervix not completely dilated, but dilatable; interference here was premature; further delay or the use of a Voorhees bag or version might have avoided this fatality.

CASE 3.—Death from pneumonia on eighth day; an occipitoposterior position in a 30 year old primipara; the child was resuscitated with difficulty; the same criticism as in case 2, might be made of the conduct of this case.

If the methods of delivery alone are considered, in all there were 3 deaths in 394 cases, or a fetal mortality of 0.76 of 1 per cent. There were 215 primiparae; 185 multiparae. There were 36 high and mid-forceps; 44 low forceps; 1 version for placenta previa; 3 induced labors for toxemia; 4 pairs of twins; 16 breech presentations. Cesarean section was done in 10 for the following indications:

CASE 1.—Distortion of the uterus following ventrofixation; no progress after 8 hours of labor.

CASE 2.—Increasing blood pressure and preeclamptic toxemia ten days before term; short, stocky primipara.

CASE 3.—Funnel pelvis, history of previous difficult labor, and dead child.

CASE 4.—Cicatricial contraction of vagina and cervix, history of previous difficult delivery and dead child.

CASE 5.—Small pelvis (internal conjugate 8), large child—10 pounds 5 ounces; no progress after test of labor; cervix edematous.

CASE 6.—Previous cesarean section, and early in married life, before conception, multiple myomectomy incisions in fundus (Porro operation).

CASE 7.—Multipara of forty-one; dystocia from rigid cervix following cervical repair; no progress after 12 hours, and use of Voorhees bag.

CASE 8.—Pregnancy in right horn of a uterus bicornis; malpresentation and history of two stillbirths.

CASE 9.—Pregnancy in the left horn of the uterus bicornis of the same patient two years later (Porro operation).

CASE 10.—Preeclamptic toxemia, placenta previa and transverse position of infant.

We are aware that this is a small series of cases, and attach value to the lessons it teaches only because it includes every case, and so far as we can see gives an adequate estimate of unavoidable and avoidable fetal mortality.

Moreover, it has afforded us ample opportunity to observe the value of patient waiting in the practice of obstetrics. Harrar has aptly expressed it, "Patience in obstetrics is next to asepsis, but it must be the active patience of close observation; not the passive patience of ignorance, allowing the mother to become totally exhausted or the baby in imminent peril of death before determining a line of action."

Perhaps the most trying cases were the dry labors, with ineffective pains and very slow dilatation of the cervix. Here the Voorhees bag has been of the greatest help, for by its use alone delivery has often been affected.

In the entire series very careful antenatal treatment was carried out throughout pregnancy, and we are firmly convinced that in this way the size of the child can be considerably influenced. During labor the expectant plan was adopted, and interference was never undertaken until danger threatened the mother or child.

The point we wish to make is that practiced in this way, obstetrics is a difficult proposition, and that some babies are likely to be lost because the obstetrician is unfit at the time he is called upon to act. The most frequent error of commission is to attempt delivery before the os is completely dilated, and to this cause we attribute two fetal deaths in our series. Not infrequently, the importunities of the family and of the patient prevail, and although the obstetrical at-

tendant may be successful in spite of this handicap, in the long run he will do better if he uses a bag or waits until the cervix is fully dilated.

Granting that conservative obstetrics give the best results, we should endeavor to surround the patient and the attending obstetrician with the most ideal conditions, so that *whenever labor begins*, the patient will have adequate and skilled attention throughout, *no matter how long it lasts*. But to practice obstetrics in this way—patiently to wait, taking no thought of one's convenience, forcing one's self to the limit of endurance—is, in our experience, so laborious a task that it seems almost impossible for a man to continue it indefinitely. How many of us have struggled wearily through the night, only to be confronted in the morning by some grave obstetric problem that we had to meet promptly and effectually if we were not to lose both patients! Dare we hesitate to ask whether many of the methods for the conduct of obstetrics that have arisen in later years have, wittingly or unwittingly, been originated primarily for the benefit of the harassed obstetrician, and thus secondarily, of course, for the benefit of the patient? Furthermore, has not the drudgery of this work kept many physicians and nurses from practicing obstetrics, or induced them to abandon it just when they had had enough experience to render them really valuable?

At a meeting of this Society two years ago, we suggested, as a remedy, the formation of obstetrical partnership in maternity hospitals. There seemed to be considerable doubt as to whether such a plan would be feasible. There is a conviction in the minds of many that the pregnant woman pins her faith to one man, and would be disinclined to employ as accoucheurs a partnership of two or three, any one of whom she might happen to get as her immediate attendant. The objection has been raised that a case started with one man could not be turned over to another without resulting disadvantage to the patient. Personally, we believe that the disadvantages are more fancied than real, and that the woman would soon realize what this meant to her and would become an enthusiastic supporter of the plan. If such a plan came to pass, fetal and maternal mortality and morbidity statistics would improve, and the pernicious practices now in vogue would disappear, since they would no longer be attractive.

In closing this paper, we wish to pay tribute to Potter and to De Lee for their contributions to the art of obstetrics. Potter has added to our knowledge of version and breech extraction. We have little doubt that in many posterior positions of the occiput his plan may take the place of axistraction forceps and of Scanlon's maneuver, and give better results. His work marks a distinct

advance in the development of the technic of version. It is to be deplored, however, that he does version routinely. On two occasions we have seen De Lee perform his prophylactic forceps operation; it was a masterly demonstration, and we wish to add our congratulations on his achievement. When the head is delayed in the second stage, and immediate delivery is indicated, the method of De Lee cannot be surpassed. The obvious criticism of these methods of starting or terminating labor artificially, is that we have not yet shown that in this way we can improve on the normal process.

CONCLUSIONS

1. Routine induction, routine version, and routine prophylactic forceps, increase the danger of childbirth to both mother and child.

2. Labor should not be started or ended routinely. Induction forceps and version should not be employed unless they are definitely indicated in the individual case for the sake of either the mother or the child.

3. There is an *unavoidable* fetal mortality in labor of from 1.5 to 2 per cent; in other words, that proportion of infants *at term* will be born dead, irrespective of the methods employed. In reporting a series, the details of every fetal death should be given. The *avoidable* fetal mortality in conservative obstetrics may be estimated at about 1 per cent.

4. The woman in labor should have constant and continuous attendance of a competent obstetrician, throughout labor, no matter *when* it starts or *how long* it lasts.

5. The practice of obstetrics should be carried on by obstetrical partnerships; when this practice comes into vogue, objectionable routine methods will be abandoned and maternal and fetal mortality statistics will improve.

REFERENCES

- Beck*: Is Interference Justifiable after Twenty-Four Hours of Labor When No Other Indication Is Present? *AM. JOUR. OBST. AND GYNEC.*, Dec., 1922, p. 623.
Danforth: Is Conservative Obstetrics to be Abandoned? *Internat. Survey*, Aug., 1922. Obstetrical Section (3b—131).
Eden: Maternal Mortality of Child-Bearing: Its Causes and How to Deal with Them. *Internat. Jour. Surgery*, Jan., 1923, v, 53.
Ehrenfest: Birth Injuries of the Child. Appleton & Co., 1922, p. vii of Preface.
Harrar: Functional Dystocia in Normal Pelvis: Recognition and Management. *AM. JOUR. OF OBST. & GYN.*, March, 1923, v, No. 3.
Holmes: The Test of Labor in Relation to Cesarean Section; Comparative Results Obtained by Elective and Secondary Operations Based Upon a Personal Experience of 92 Cases. *AM. JOUR. OBST. AND GYNEC.*, Dec. 1922, p. 579.
Holmes: The Fads and Fancies of Obstetrics. A Comment on the Pseudoscientific Trend of Modern Obstetrics. *Trans. Am. Gyn. Soc.*, xlii, 12.
Nicholson: An Anachronism of the Twentieth Century—the Midwife. *Tr. College Phys.*, 3d Series, 1921, xliii, 495.
Polak: Forced Labor; Its Status in Obstetric Teachings. *Am. Gyn. Soc.*, xlii, 24.
Potter: Version, Mosby, St. Louis, 1922.
Reed: Induction of Labor at Term. *Tr. Am. Gyn. Soc.*, 1920, xlv, 40.
Watson: Further Experience with Pituitary Extract in the Induction of Labor. *AM. JOUR. OBST. AND GYNEC.*, Dec. 1922, p. 603.

WEIGHT IN PREGNANCY; ITS VALUE AS A ROUTINE TEST*

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ROUTINE recording of a patient's weight during pregnancy has given very valuable information. Zangemeister, in 1916, showed how such records were of value especially in case of edema, but thus far no one has seriously urged the addition of this third test in prenatal work. In this paper further data will be presented with the hope of establishing its importance.

The work of Gassner, published in 1862, serves as a basis for the statements regarding weight in pregnancy for all of the recent books on obstetrics. After a two year experience with routine weighing of patients I am convinced that many of his conclusions must be modified. While it is undoubtedly true as he states that: "the amount of gain of the body is, within physiological limits directly proportional to the size of the quantity of its mass," one may well question the wisdom of permitting the woman who is already overweight to gain excessively during pregnancy. Zangemeister's is the only other important paper dealing with this subject, and he also drew erroneous conclusions regarding the terminal loss in weight, as has been shown by Lorenzen and Nebel. The study of Baumm practically confirmed the work of Gassner. These preliminary papers will be of value as a basis for the detailed observations of large series which will come from big clinics.

In a study of this subject the question which first arose in my mind was, what is a normal gain for the period of pregnancy? The only information available was from the German articles. Gassner found that during the last three months the average gain amounted to $\frac{1}{12}$ of the body weight at the end of the second trimester. This means an average gain during this period of $3\frac{1}{2}$ to 5 pounds (1.6 to 2.5 kg.) per month. This would tend to leave the average woman overweight following the puerperium. The loss of weight which may be expected is shown in Table I.

Zangemeister shows a rather low weight loss which may well be accounted for when one considers: (1) that this study was made during a time when the German women were on a limited diet and therefore did not gain excessively as in the time of Gassner, and (2) the loss subsequent to delivery was reduced, due to the change from the older liquid diet to an ample general diet. A study of my own pa-

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TABLE I

	GASSNER (201 CASES)	BAUMM (60 CASES)	ZANGEMEISTER (77 CASES)
Weight difference between beginning and end of labor.	6.56 Kg.	6.24 Kg.	5.93 kg.
Weight difference between end of labor and discharge	4.84 kg.	3.64 kg.	1.61 kg.
Total Loss	11.40 kg.	9.88 kg.	7.54 kg.

tients, who were average normal women, showed that the weight loss subsequent to delivery and the puerperium varied from about 15 to 20 pounds. This being the case it seemed logical to conclude that when a woman's weight was within normal limits before pregnancy, her gain should not exceed 20 pounds (9 kg.). If previously underweight she may be allowed a greater gain, up to as much as 30 pounds (13.6 kg.). There is evidence that an excessive gain is dangerous.

Baumm and Gassner agree that primiparae gain less than multiparae. Zangemeister found the reverse true in his series, but this may have been due to the reduced rations and the many difficulties of caring for small children under war conditions. All agree that heavy women tend to gain more than light ones during the last months of pregnancy.

The woman who is fat should be kept on a carefully limited diet, and as shown in the report of case 2, she may actually reduce to the benefit of herself and the growing fetus. One of my patients weighed two and one-half pounds less at the end of pregnancy than when she reported at the office at the beginning of the fifth month and still had a baby weighing 8 pounds 4 ounces. Another (case 2) lost seven and one-half pounds during the last few months. The largest gain of any patient whose urine and blood pressure remained normal was forty-five pounds. Her baby weighed 9 pounds 10 $\frac{3}{4}$ ounces, and was the largest baby in my series. She remained too heavy after delivery.

Pregnancy is usually characterized by a stimulated metabolism and improved health. Some women show an improved metabolism from the first weeks and continue to gain weight, but others owing to nausea and vomiting lose weight during the first three months. It is often important to know the amount of this loss. An excessive loss is dangerous, but by good medical and nursing care it can usually be prevented. Naturally the woman who has lost considerable weight during the first trimester may be permitted a greater average weekly gain during the second and third.

Zangemeister found there was no difference in the amount or character of the weight gain, whether the last month of pregnancy occurred in summer or winter. However, in pathologic conditions the

weight of the pregnant may deviate markedly from the usual. In isolated cases the weight may rise rapidly without demonstrable symptoms, or there may be no change, or a patient may continue to lose for weeks without apparent cause. He usually found that abnormal weight relations were the result of definite disturbances. For instance, cases with a marked loss in weight were found to have some pathologic condition such as abscesses, pyelitis, placenta previa or a dead fetus. On the other hand he observed that a "hydrops gravidarum" caused a marked rise in weight; sometimes very marked. As the edema subsides a corresponding loss in weight occurs. My observations, as will be seen from cases 4 and 5, agree with those of Zangemeister. So far as can be determined the routine weighing of the patient gives us the only reliable means of following the course of this disease and the success of the treatment. Pitting of the ankles or other parts is by no means an early sign of edema. Zangemeister speaks of the cases where retained fluids cause sudden increases in weight without demonstrable edema, as having "latent dropsy." In my experience these patients show thickening of the ankles and a general tenseness of the tissues. Recognition of the condition and prompt treatment will often prevent the rise in blood pressure and albuminuria.

It is interesting to note that in five of the eight cases of dropsy reported by Zangemeister the urine was permanently free from albumin; in two cases there appeared a moderate albuminuria just before parturition; and in one case only was a marked albuminuria present from the first. He makes no reports on the blood pressure. My observations tend to substantiate this portion of his paper, and with him I believe that insult to the kidney first leads to oligurea with fluid retention, then, if not corrected to albuminuria. Weight records are of greater value in these cases than 24 hour specimens and more easily obtained. However, the best information is obtained from a comparative study of urinalysis, blood pressure and weight.

The marked decrease of eclampsia in Central Europe during the period of war rationing led us to realize that eclamptics are usually women who have gained weight rapidly during pregnancy. Is excessive eating one of the factors in the breakdown of metabolism and the development of this toxemia? Careful regulation of the diet, checked by routine weight records may give valuable information in this particular.

What are the effects of the state of nutrition of the mother during pregnancy and labor on the condition of the child at birth and during the first days of extrauterine life? G. F. D. Smith has tried to answer this by investigating 6162 cases delivered in the lying-in hospitals of

Dublin and London. His figures seem to suggest the following conclusions:

1. "A state of bad nutrition of the mother at the time of labor due to insufficient food (1) greatly increases the percentage of dead births; (2) greatly increases the percentage of premature births; (3) slightly decreases the average weight of the full time baby at birth; (4) definitely increases the postnatal infant mortality; (5) has little, if any, effect during the first eight or ten days on the progress of babies who live during that time; and (6) possibly increases the death rate of babies during the first three or four days of life."

2. "A state of good nutrition of the mother at the time of labor, on the other hand, (1) considerably increases the average weight of the full time babies at birth; (2) increases the percentage of mothers who are able to suckle during the first eight or ten days of the puerperium, quite apart from the use of an ample diet during this time."

3. "*The figures also suggest that on the whole a state of average nutrition is the most favorable condition.*"

In a small private practice one does not accumulate numerous data, but from the patients I have carried through pregnancy during the past two years the weight records were fairly complete in 150. Of these 39 (26 per cent) were multiparae and 111 (74 per cent) were primiparae. The average gain during pregnancy was 21 pounds (9.518 kg.) and the average weight of their babies was 7 pounds 4.5 ounces (3.3 kg.).

Seventy-one of these women showed a gain of 20 pounds or less with an average of 15.5 pounds (7.025 kg.). These include 15 multiparae (21 per cent) and 56 primiparae (77 per cent). The average weight of their babies was 6 pounds 15 ounces (3.144 kg.). These women may be classified as women of average nutrition. All of the babies were born alive, but one died of erysipelas following a circumcision.

Twenty-eight women gained between 20 and 25 pounds with an average of 22.3 (10.107 kg.). Of these 9 were multiparae (33 per cent) and 19 primiparae (67 per cent). The average weight of their babies was 7 pounds 14 ounces (3.569 kg.).

Fifty-one women showed a gain of 25 pounds or more with an average of 30.2 pounds (13.688 kg.). Of these 15 were multiparae (30 per cent) and 36 primiparae (70 per cent). The average weight of their babies was 8 pounds (3.62 kg.). One baby was stillborn due to a concealed prolapse of the cord. The largest baby in the series weighed 9 pounds 10 $\frac{3}{4}$ ounces.

From my case records a few have been selected as typical of the information one may gain from weight records. The first two women by careful diet reduced their weight with benefit to themselves and

the growing fetus. The other four show various types of excessive gain and illustrate some of the attending dangers.

CASE 1.—Mrs. S., age twenty-seven, para iv, 5 ft. 2½ in., weighed 135 pounds, when examined March 2, 1922. On October 10th she weighed 142 pounds. On October 16th, she was delivered of a girl weighing 7 pounds 12 ounces. Her weight shortly after returning home from the hospital was 122 pounds. She always has gained while nursing and February 9, 1923, weighed 141 pounds. During the previous pregnancy she gained only 6 pounds and had a baby weighing 7 pounds 4 ounces. She puts on weight very easily and always diets rather rigidly, except when she is nursing her babies.

CASE 2.—Mrs. B., age thirty-eight, para ii, 5 ft. 6½ in., had weighed about 175 pounds, for a number of years. During her first pregnancy in 1921, her physician had given little or no attention to her diet, and she weighed 225 pounds, and had a blood pressure of 200 mm. when she delivered a macerated fetus at the end of the eighth month. When she was examined July 21, 1922, she weighed 196 pounds. The blood pressure was 160 mm. systolic and 106 mm. diastolic. The urine contained a trace of albumin, but no casts. During the following months she was kept on a rigid diet with a resulting fall in blood pressure and weight, and for the most part she had a perfectly normal urine. October 28 she weighed 187½ pounds; blood pressure was 148 mm. systolic; and the urine contained a faint trace of albumin and sugar. The following day she was delivered of a healthy boy weighing 6 pounds 14 ounces. On November 9th she weighed 167 pounds. She had plenty of milk.

CASE 3.—Mrs. G., age twenty-five, para ii, when 6 months pregnant, March 21, 1921, weighed 152.5 pounds, blood pressure 110—68 mm., and urine was negative. April 20th, the systolic blood pressure was 118 mm.; urine negative, and the weight was 157½ pounds, a gain of 5 pounds in thirty days. May 24th, she had a blood pressure of 124—80 mm., negative urine and a weight of 166½ pounds, a gain of 9 pounds in thirty-four days. She was instructed to limit her diet and to report within a week. June 1st, the blood pressure was 120—76 mm.; urine negative and the weight 168 pounds. Thinking us unduly alarmed she did not follow instructions and failed to report the following week. June 11th, I was called to the house and found her markedly edematous. The blood pressure was 170—90 mm., and the urine contained a large amount of albumin and a few casts. Under active treatment there was slight improvement, but on June 17th, labor was induced prematurely by use of a bougie, and she was delivered of a healthy boy weighing 5 pounds 11 ounces. June 26th the blood pressure was 106—68 mm., and the urine negative. November 28th her weight was 138 pounds, which was normal for her.

CASE 4.—Mrs. S., age twenty-nine, para i, whose last period began August 1, 1920, weighed 135 pounds, November 8th. Her urine was negative and the blood pressure 110—70 mm.; November 29th the weight was 137 pounds; December 20, 140 pounds; December 31st, 141½ pounds; January 22, 144 pounds; February 14, 149 pounds; February 21st, 149½ pounds; March 4, 150 pounds; March 12, 153 pounds; and she complained that a crowned tooth was aching. She went directly to the dentist who found the tooth abscessed and extracted it. March 21st the blood pressure was 130—80 mm.; the urine negative, but she weighed 158 pounds. March 24th the blood pressure was 126—78 mm., the weight still 158 pounds, but the urine contained a faint trace of albumin. The patient complained of her thick ankles, but there was no pitting. March 28th the weight was 159 pounds, the blood pressure 130—70 mm., pulse 90 and the urine negative. I thought I had been unduly alarmed regarding the previous rapid gain and told her to report one

week later. April 4th the blood pressure was 146—80 mm.; the weight 166 pounds; and the urine contained a heavy ring of albumin, but no casts. Owing to the gain of 7 pounds, in as many days she was sent home to bed and placed on a starvation diet for twenty-four hours in addition to castor oil and magnesium sulphate. Four days later the edema was much less and the blood pressure was 136—90 mm. She was kept in bed most of the time on a restricted diet. No further weight records could be obtained. April 27th she went into labor spontaneously. June 16th the systolic blood pressure was 110 mm.; the urine normal and the weight 141½ pounds.

CASE 5.—Mrs. G., age thirty-three, para i, 5 ft. 5¼ in., usual weight 104 pounds, was first seen November 7, 1921. At that time the urine was negative, systolic blood pressure 96 mm. and she weighed 115 pounds. Owing to her previous underweight she was told that her maximum weight might be as much as 135 pounds. However, she had a very good appetite and in spite of repeated warnings would not limit her diet. November 28th the weight was 122 pounds; December 17th, 125 pounds; January 11th, 1922, 136½ pounds; January 25th, 142 pounds; February 9th the urine was negative, the blood pressure 106—72 and the weight 147½ pounds. The evening of February 14th the husband telephoned that she had a little headache and swollen feet. He was instructed to give her 3ij castor oil and report on her condition the following morning. (They lived some thirty miles in the country). I did not hear from them until February 16th when she came to the office. Her blood pressure was 130—96 mm., the urine contained a heavy trace of albumin, but no casts and her weight was 155 pounds. She was sent to the hospital, and again given castor oil. A basal metabolism reading made the following morning was -70 per cent. The blood pressure had increased to 150 mm., and the urine contained more albumin and casts. Labor was induced with a Voorhes bag, but as there was little progress and she was developing eye symptoms, that evening she was delivered by vaginal hysterotomy and high forceps. The baby weighed 5 pounds 4 ounces. Recovery was slow, but mother and baby left the hospital in good condition.

CASE 6.—Mrs. Z., age twenty, para i, usual weight 98 pounds, was first seen when six months pregnant. She then weighed 115 pounds; November 28, 1921, 120½ pounds; blood pressure 122 mm., urine negative. December 15th, 126 pounds; December 22nd, 128 pounds; blood pressure 136 m.m., urine negative; December 28th, 129½ pounds, blood pressure 130 mm., urine negative; January 3, 1922, weight 133 pounds, blood pressure 140 mm., urine contained trace of albumin and there was some swelling of the feet. She was given magnesium sulphate 3 ij, and January 5th weighed 131 pounds, but the blood pressure was 142 mm. There was still a little edema and the urine contained a trace of albumin, but no casts. January 1, 1922, the weight was 130 pounds, blood pressure 140 mm., very little evidence of edema, but still a trace of albumin. She went into labor spontaneously and the morning of January 9th, was delivered by low forceps after an easy labor. Six hours later she had her first convulsion. She was given active treatment including 20 per cent glucose solution intravenously, bleeding and inframammary normal salt solution as well as large doses of morphine and codeine. After sixteen convulsions she gradually responded to treatment and made a complete recovery.

Urinalysis was for many years the only routine test employed during pregnancy. Within the last decade the value of blood pressure readings, previously rarely used as a special test, has been gradually recognized. Both of these tests give valuable data; but as I have shown in a few typical case reports the information gained from routine recording of weight greatly enhances their clinical value. I

therefore feel justified in urging the use of this third simple test in all prenatal work.

The information given in this paper may serve as a basis for future work where large numbers of patients may be followed,—it would not justify the drawing of definite conclusions except in the diagnosis of latent dropsy. Regarding this point there can be no difference of opinion.

REFERENCES

Davis, C. H.: *Jour. Am. Med. Assn.*, 1923, lxxx, 249. *Gassner*: *Monat. f. Geburtsh.*, 1862, xix, 1. *Lorenzen, H.*: *Ztschr. f. Geburtsh. u. Gynäk.*, 1921, lxxxiv, 426. *Nebel, L.*: *Med. Klin.*, 1922, xviii, 339. *Smith, G. F. D.*: *Lancet*, London, 1916, exci, 54. *Zengmeister, W.*: *Ztschr. f. Geburtsh. u. Gynäk.*, 1916, lxxviii, 325.

141 WISCONSIN STREET.

(For discussion see page 631.)

A SIMPLE METHOD OF TESTING THE PATENCY OF THE FALLOPIAN TUBES*

BY N. SPROAT HEANEY, M.D., CHICAGO, ILLINOIS.

VARIOUS methods for determining the patency of the fallopian tubes were, from time to time, advised and practiced with indifferent results prior to Rubin's initial article on transuterine sufflation of the tubes. The publication of this article marks one of the most important steps in the practice and study of the diseases of women.

In Rubin's original method, oxygen was conducted into the peritoneal cavity through the uterus and tubes from a tank, after passing through a reducing mechanism. That the tubes were patent and that the oxygen had entered the peritoneal cavity was determined by means of the roentgen rays. The quantity entering the abdomen, was measured by means of an ingenious gas meter, while the pressure necessary to make the gas pass was gauged by still another apparatus. Subsequently, carbon dioxide was substituted for oxygen since its absorption from the peritoneal cavity was more rapid.

Rubin, Peterson, Brandt, Hirst, and Moser, and others have contributed valuable articles, using this method of determination, have offered suggestions and modifications of the process, and have greatly added to our understanding of sterility.

Dawson Furniss simplified the technic by eliminating the use of the roentgen rays in cases where the only question for investigation was the patency of the tubes. Carbon dioxide is admitted through a T connection with manometer to a 30 c.c. Luer syringe which, when

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filled, injects the gas through a cannula with rubber tip into the uterus. Fifteen cubic centimeters or less of gas will fill an ordinary uterus. If 30 c.c. pass, one tube is surely patent. By filling the vagina with boric acid solution until the cervix is immersed, regurgitation can be detected. Furniss suggested that the technic might be further simplified if air should be used instead of carbon dioxide.

Robert L. Dickinson asserts that air is perfectly satisfactory as a medium for injection. He uses a Skene's uterine tube fitted with a suitable bulb pump. A lubricant at the external os gives evidence of regurgitation. He rightly states that a pressure gauge is unnecessary, since the fingers learn to recognize the proper resistance, and that the feelings of the patient indicate the time to cease the injection. Bethel Solomon, in an article on sterility published in February, 1920, recommended the use of an ear syringe to determine the patency of the tubes during the course of abdominal operations. I tried this method of studying the tubes and found it so satisfactory that I have used it constantly since, and ear syringes are a part of the equipment made ready for every abdominal operation.

As soon as Rubin described his method, and he and others had shown the harmlessness of the transufflation, I adapted the use of the ear syringe to testing the patency of the tubes from below. Not only has this been tried on every case of sterility examined since that time, but experience has been gained by trying transufflation on every case which was to have the peritoneal cavity opened either vaginally or abdominally.

All cases are tested in the lithotomy position. With the usual preliminary precautions, the cervix is exposed by narrow vaginal retractors and is grasped with bullet forceps. In the usual case, the cervix can be drawn down far enough so that the plain one-ounce all-rubber ear syringe can be adapted to the cervical canal. Frequently, however, the cervix will not come down this far without discomfort, in which event a syringe is used which has had a straight or curved medicine dropper glass inserted into the rubber nozzle. In rare cases the cervical canal is so patulous that a glass connecting tube is used instead of the medicine dropper.

In most cases air readily passes into the peritoneal cavity with a peculiar audible whistling or gurgling sound. Occasionally, light pressure must be used before the air passes. If the tubes are closed, air refuses to pass after the syringe is about half empty. If the syringe empties, there is assurance that the tubes are open. When doubt occurs as to regurgitation at the external os, the vagina may be filled with water until the cervix is immersed, or a lubricant may be used in the cervical canal, so that if leakage occurs, bubbles will be seen. At Barton Cook Hirst's suggestion, a stethoscope is placed upon the

abdomen just above the pubes, and auscultation shows whether the air passes through only one or both tubes.

In the first few tests, I was not prepared for the ease with which the air passed through the tubes, so that several syringes full were used in these cases with the resultant shoulder pains which are typical of a quantity of gas in the peritoneal cavity. With added experience, one syringe of air makes a conclusive test, so that patients are spared the shoulder pains and experience no discomfort except the transitory bite of the bullet forceps.

The method is simple of performance and conclusive in its findings. No training is necessary to perfect the technic. Anyone capable of performing a curettage is able, safely and definitely, to make conclusive record regarding the patency of the fallopian tubes.

REFERENCES

Solomon, Bethel: Surg. Gyn. & Ob., Feb., 1920. *Rubin*: Jour. Am. Med. Assn., Apr. 10, 1920. *Ibid*, Nov. 3, 1919. *Ibid*, Sept. 4, 1920. *Am. Jour. of Roent.*, 1921, viii, 120. *Furniss Dawson*: Surg. Gyn. & Ob., Nov., 1921. *Hirst and Moser*: AM. JOUR. OBST. & GYNEC., Aug., 1922. *Dickinson, Robert L.*: AM. JOUR. OBST. & GYNEC., Aug., 1922, x. *Brandt, Murray L.*: Jour. Am. Med. Assn., Feb. 10, 1923. *Peterson, Ruben*: AM. JOUR. OBST. AND GYNEC., Oct., 1921, 349. *Jour. Am. Med. Assn.*, Feb. 11, 1922.

920-104 S. MICHIGAN AVENUE.

(For discussion see page 627.)

THE TEACHING OF OBSTETRICS AND GYNECOLOGY*

BY W. B. HENDRY, M.D., F.A.C.S., TORONTO, ONT.

IT has been with some trepidation and much thought that I have selected as my theme "The Teaching of Obstetrics and Gynecology" with particular reference to the system followed in the Faculty of Medicine of the University of Toronto. Nor have I chosen this theme because I felt that we have solved the problem, but because the whole subject of medical teaching has been arousing considerable attention throughout the English speaking world, and we have in our Department of Obstetrics and Gynecology tried out a system which has attained a fair measure of success.

As I have said, the teaching of medicine has of recent years been the subject of much consideration, and the present system of instruction, which divides the medical course into two parts, confining the fundamental sciences to the primary years and the clinical subjects, with pathology, hygiene and so on, to the final years, has met with a great deal of unfavorable criticism. The report of the Edinburgh Pathological Club in 1918, disapproved what it described as a watertight compartment system of teaching, and advocated not only the

*Read by invitation, at the Forty-eighth Annual Meeting of the American Gynecological Society, Hot Springs, Va., May 21-23, 1923.

coordination of the teaching of practical and theoretical work in a given subject, but also the coordination of the teaching of that subject with the teaching of other subjects.

In the report of the Carnegie Foundation for 1921, on Medical Progress, President H. S. Pritchett, states that the student learns anatomy by a tedious process of dissection upon which he spends a large amount of time, but that he has a very good opportunity to forget most of it before seeing in practice the application of his anatomie studies; and further remarks that the fundamental sciences can be taught, "not as something apart from the medical practice, but as a part of it."

At the Congress on Medical Education in Chicago, in 1922, Dr. Frank Billings maintained that it was a mistake to have separated the fundamentals of medicine from the clinical branches, so that there is no real coordination between them. Moreover, at a recent meeting of the Educational Section of the American Medical Association, Dr. E. S. Ryerson proposed a tentative curriculum of coordinated study which he had worked out in detail on a vertical basis, as opposed to the horizontal basis of the present curriculum. Australia, too, has expressed dissatisfaction with existing conditions of medical education and has advocated some proposals for the reform of the system.

The keynote of all this criticism and advocated reform of the present day methods is a desire for coordination of the fundamental and the clinical subjects and for cooperation between departments, with a view to diminish the load of the student by preventing duplication of work and to increase his interest by combining theoretical principles with their practical application. And while the substitution of the Ryerson scheme for the present day curriculum would be highly revolutionary and would require time to accomplish, still the tendency towards coordination is already evidenced by the number of schools in which the allied subjects of obstetrics and gynecology have been combined. Dealing, as these subjects do, with the female reproductive organs under all conditions of physiologic and pathologic change, it is natural to assume that they can be taught more satisfactorily together than apart, to the greater advantage of the student and with a lessened expenditure of time.

Let us examine a practical illustration at the University of Toronto. Existing conditions there made it possible eleven years ago to combine these two departments under one head, and since that time an organization has been evolved through which the training has been carried on much more efficiently than in former years. The responsibility of the dual department rests with the head, and with him are associated two senior and several junior assistants and demon-

strators. The service is a rotating one, by which a one-sided development of the staff is avoided. The junior assistants alternate every three months in obstetrics and gynecology, while continuity of the service is maintained by having one member of the staff permanently responsible to the head for the proper administration of each of the following subdivisions:—out- and in-patient services in obstetrics, out- and in-patient services in gynecology, and the pathologic laboratory which is maintained distinct from the department of general pathology. The staff, as a whole, is on a part-time basis, but two demonstrators and one resident are on a full-time basis and are engaged in research work as well as in assisting with the teaching. The resident fellow obtains his appointment as such after having served satisfactorily for one year as interne on a rotating service in a general hospital, one year as senior interne in obstetrics and gynecology and one year in general pathology and bacteriology. He may later be taken on the staff as a full-time demonstrator, and in due course, be appointed to the visiting staff of the hospital and of the medical faculty.

This, in brief, is the organization of the Department of Obstetrics and Gynecology of the University of Toronto, and of its teaching hospital. Complete harmony exists among the members of the staff itself, and uniformity of teaching methods is arrived at by regular staff meetings. The establishment of our own special museum and pathologic department has been considered inadvisable by some, but it has proved to be a very satisfactory means of rounding out the departmental unit. Monthly conferences are held with the Department of Pathology for the purpose of maintaining a uniform system of teaching this subject, stabilizing the nomenclature and developing a distinctive school of thought.

A metabolic unit has also been established in the obstetric wards, and investigations of the toxemias of pregnancy are being carried on in cooperation with the Department of Pathologic Chemistry. It will be seen, therefore, that the clinicians and the laboratory workers are being brought into intimate touch with each other, with the result that each group of teachers has obtained an increased breadth of view and a more sympathetic understanding of the others. There is a closer community of interest, more hearty cooperation between the departments and greater possibilities for efficient work.

Besides the staff the other factor involved in the teaching of students is the patient, and it is important that she should be treated with tact and humane consideration, and that the student should be taught the necessity for gentleness as well as for painstaking care in her examination. We must protect her as far as possible during clinics and allay her fears in order to gain her cooperation. For this

reason no clinics are held in the gynecologic wards. In both our in- and out-patient services all clinic patients are placed on an examining carriage, completely draped and brought into the clinic room, part of which is curtained off for their reception. At no time do they see the students, and when required they are wheeled forward, head and chest remaining behind the curtain. The method of pelvic examination is taught with the patient lying on her back, legs flexed on thighs, soles of the feet together and the knees falling apart. Only gynecologic patients are used for the purpose of instruction in the examination of the pelvis, and on these the student learns the use of the pelvimeter; the out-patients in gynecology being measured internally and externally as a routine by the student for the purpose of instruction and practice.

Waiting patients in the obstetric wards are made use of for teaching abdominal palpation and external pelvimetry, but not for instruction in bimanual examination, the student being warned concerning the danger of introducing infection. We have found that as long as the student is impressed with the idea that while making his examination he is dealing with a human being who comes seeking relief, and not with a model of clay, there is no difficulty in getting the cooperation of the patient.

In Toronto, as elsewhere, the student commences the study of obstetrics and gynecology late in his course, and as he must approach this subject from an anatomic and physiologic point of view, it is to be regretted that the present arrangement of study does not permit him to carry out his dissection of the female pelvis and his course in the physiology of reproduction, concurrently with his introduction to the study of obstetrics and gynecology. As it is, he has taken his course in anatomy years before and has for the most part forgotten it at a time when it would be of definite value to him, with the result that we have to spend hours in repeating instruction already given by the anatomist and physiologist.

Our course in obstetrics and gynecology is confined to the final two years. In the first of these the whole of the subject is covered by a series of lectures and demonstrations. Ninety lectures in all are given on the principles and practice of obstetrics and gynecology, while twenty demonstrations are given in history taking, mechanism of labor, pelvic measurements, use of instruments, pathology and so forth, one sixth of the class at a time attending each demonstration. When the classes are small the demonstrations are of much greater value than when they are large. Our difficulty at the present time is in dealing with large classes. At the close of the war many returned men entered medicine and the following year a larger number entered the first year in order to come under the five year regime,

and thus avoid the necessity of taking the six year course, then about to be introduced. The result is that in each of our final years we have over two hundred students, much too large a number for satisfactory work. With the establishment of the six year course the number permitted to enter medicine was limited to one hundred and twenty each year, so that our present difficulty is only temporary. However, just now the full value of the demonstrations is lost owing to the size of the class,—the student is not brought close enough to his subject. He cannot handle the models, the instruments and so on, neither can he use any other of his senses than those of sight and hearing, with the result that the demonstration is lowered to the level of a didactic lecture, which is the least valuable means of imparting knowledge no matter how many aids such as lantern slides, charts, films, etc., are employed to add to its interest and fix the attention of the student.

The bedside clinic is the ideal method of teaching, but it too has its limitations, as its effectiveness depends on the number of students and the amount of clinical material available. The larger the class the less opportunity there is for personal contact with the patient, and the clinic itself ceases to be a clinic and becomes a conference or a lecture.

While our junior year is largely didactic, we have endeavored to make our final year almost entirely clinical. The class is divided into six groups, each of which devotes five weeks wholly to obstetrics and gynecology. During that time the students have their headquarters in the obstetrical building and absorb the atmosphere of the department. They attend all cases of labor occurring in the public wards of the hospital during their term, and each student lives in hospital until he conducts at least one case of labor under supervision. While the requirements of the course call for attendance at twenty cases, the average number seen is about thirty-five.

Each of the six groups, above mentioned, is subdivided into five small groups of seven students, and the time-table is arranged so that each student obtains instruction in every branch of obstetric and gynecologic practice. Special attention is paid to his training in antenatal care, abdominal palpation, and pelvic examination, and the course is made as practical as possible for him. The laboratory side of his training is not neglected, however, and gross and microscopic specimens of conditions under discussion are demonstrated at the clinics. Clinical and pathologic conferences are held once a week and cases assigned to each student to follow up and report in full at the end of his term. Plenty of time is given for him to study the pathologic specimens in the museum, and he is encouraged to read

independently of his clinics, notes of all of which he is required to turn in when his course is finished.

In addition to the instruction of each group a clinical lecture is given to the whole year once a week, by means of which the student is kept in touch with the subject during the periods when he is not intensively studying it.

While the system of intensive study may be open to criticism we feel that it has worked out satisfactorily in the few years in which it has been in practice in Toronto, and we are turning out students who have a proper conception of the necessity for prenatal care and who know how to make a pelvic examination, two things which go far towards making a good start in general practice.

100 COLLEGE STREET.

(For discussion see page 622.)

THE POSTMATURE CHILD

BY CHARLES D. O'KEEFE, A.B., M.D., ST. LOUIS, MO.

(Department of Obstetrics, Washington University School of Medicine.)

DURING the past year numerous large babies were delivered at Barnes Hospital. The difficulty encountered in several of these cases has prompted the writer to go over the histories of all the large babies weighing 4000 grams, or more, in detail, in an effort to determine what measures, perhaps, could be taken in procuring better results for both mother and child.

Every obstetrician knows too well the difficulty experienced in the delivery of large babies, this difficulty increasing as the pelvic and the fetal measurements approach one another, especially the true conjugate and the biparietal. McDonald states that he has never seen a child successfully delivered where the biparietal diameter was greater than the true conjugate. As a rule no difficulty is experienced in the delivery of the large mature or even postmature child when dealing with the justomajor pelvis. However, the situation becomes decidedly uncertain when the obstetrician is confronted with the mature child and the contracted pelvis, or with the postmature child and the normal pelvis, a fact borne out by the occurrence of a greater percentage of maternal injuries and a higher fetal mortality in such cases.

The position of the fetus, of course, plays an important part and the occipitoposterior position is, unfortunately, encountered in a large percentage of these cases. The method of delivery is always one of great importance, and often the choice of procedure is very confusing. The labors are much longer than the average and necessarily more strain is brought to bear on the mother, which may be of great

importance in case of some constitutional or specific disorder. Should these deliveries be hastened by some operative procedure and, if so, what method should be used? Whatever method is employed in emptying the uterus of the oversized fetus, the operator is always cognizant of the fact that better results might have attended his efforts had delivery taken place at an earlier date, when there would have been far less disproportion between the pelvis and the presenting part. If labor is to be induced, the time for the induction is of very great importance, if no doubt exists in the mind of the obstetrician as to the maturity or postmaturity of the fetus. In order to determine this maturity, every available method should be used; a careful menstrual history should be taken, and, although only an approximate estimation of maturity is possible in most cases, it is reasonably accurate in the more intelligent patients. The various fetal measurements *in utero* should be made and the technic perfected, and finally the date of quickening, which is only a help in approximating the date of term in weeks rather than in days.

For many years various methods of measuring the fetus *in utero* have existed, and, although several of these have proven more or less misleading and others have been of doubtful value, the methods of Ahlfeld, Perret, Budin, Munro-Kerr, Stone, McDonald and others are well known but practiced by very few. Each has claimed good results in estimating the size and maturity of the fetus and all the condemnation of the methods in general emanates from that great majority who have never used any of the methods, or, if so, have given them only a very superficial trial. Reed, of Chicago, has written a very interesting and instructive paper recently on "The Induction of Labor at Term," bringing out the importance of mensuration *in utero* in determining the maturity or the postmaturity of the fetus, and also pointing out the indication for the induction of labor in the mature or postmature fetus in the normal pelvis in contrast to the induction for contracted pelvis before maturity has been reached.

Reed measured the fetuses *in utero* by a method as improved upon by McDonald. He measured the height of the uterus and found the estimated measurements for maturity to be correct, that is, when the top of the fundus is 35 cm. above the symphysis pubis the fetus is supposed to have reached maturity and to weigh approximately 3,300 grams. McDonald also states that for every centimeter above or below 35 cm., there will be a variation of 200 gm., in the weight of the fetus; in this Reed did not concur. Reed, as did McDonald, Perret and others, measured the occipitofrontal diameter *in utero* and estimated the biparietal by careful deductions based on averages studied from similar measurements on the living child. Perret made a fixed

deduction of 2.5 cm., on every case, but McDonald proved that this would not hold true and offered certain deductions as follows:

For an occipitofrontal of:

12	cm., deduct 2.5	cm., for the biparietal.
11.5	cm., deduct 2.23	cm., for the biparietal.
11.25	cm., deduct 2.0	cm., for the biparietal.
10	cm., deduct 1.5	cm., for the biparietal. (added by Reed.)

Reed's results were very gratifying, as the postpartum measurements of the occipitofrontal diameter were the same as the antepartum estimate in 40 per cent of the cases; varied 0.25 cm. or less in 34 per cent; within 0.5 cm., in 24 per cent, and within 1 cm. in 4 per cent. The biparietal estimations were slightly less accurate, being exact in 36 per cent; within 0.25 cm. in 31.7 per cent; within 0.5 cm., in 24 per cent, and to vary by 1 cm. or less in 6.5 per cent of the cases. In looking over the literature, the above four fixed deductions were the only ones found. Thus far any occipitofrontal measurement not falling within these limits or on the exact numbers as given, a new number for deduction would necessarily have to be chosen more or less at random in order to estimate the biparietal in that given case.

With this in mind the writer has worked out a formula for calculating the biparietal from a known occipitofrontal measurement as follows: $\frac{\text{O.F.} + 7}{2} = \text{B.P.}$ This formula will estimate in tenths of centimeters, as is desired, and does away with all numbers picked at random. As compared with Reed's and McDonald's results, its accuracy is found to be as follows

McDonald's deductions

O.F.	B.P.	Formula.
12 cm. — 2.5 cm.	9.5 cm. — 9.5 cm.	
11.5 cm. — 2.25 cm.	9.25 cm. — 9.25 cm.	
11.25 cm. — 2 cm.	9.25 cm. — 9.17 cm.	
10 cm. — 1.5 cm.	8.5 cm. — 8.5 cm.	

In McDonald's deductions we find the same biparietal for an occipitofrontal of 11.5 cm., and 11.25 cm., which, of course, is not consistent or accurate enough when important differentiations are to be made.

The length of the child is determined by Ahlfeld's method, by measuring the actual length of the long axis of the fetus *in utero* by means of calipers, one end of which is rested against the presenting part in the vagina and the other against that part of the fetus in the fundus of the uterus; this measurement is multiplied by two in estimating the actual length of the fetus,—maturity 48-52 cm. This method was found to correspond to the antepartum estimate in 37

per cent of Reed's cases, to vary 0.5 cm., or less in 24 per cent, and less than 1.5 cm. in 29 per cent.

As stated before, mensuration *in utero* is not universally employed and has not been employed as a routine at Barnes Hospital and the Washington University Dispensary, although used in occasional cases. This limited experience is somewhat unfortunate, perhaps, because the perfection of the method depends upon the experience gained over a great number of cases carefully measured and should not be limited to those where the question of disproportion is an issue. Any technic should be given fair trial that promises light on such an important subject. It is important not only from the standpoint of maturity or postmaturity of the fetus, but the actual measurement of the height of the fundus should give a closer knowledge of the growth of the fetus throughout pregnancy; the period of gestation and the comparison of the size of the fetus to that period is of great importance at all times. McDonald states that the height of the uterus in centimeters divided by 3.5 will give the period of gestation in lunar months. With this technic perfected one should have a very valuable asset in checking the death of the fetus *in utero* and the cases of missed abortion after this height has once been shown to coincide with the height suggested from the menstrual history; thus the one could always be checked against the other.

Of the hundred and fifty-two cases weighing 4000 grams or more, collected during the period intervening between Jan. 1, 1915, and Jan. 1, 1922, there were 48 primiparous and 104 multiparous women. Of this number 148 were white and four colored. There were 144 pelvis classified as normal, two were generally contracted, slight, one generally contracted, rachitic, one flat, one funnel, and three classified as justomajor. From the menstrual history 31 were premature, four exactly at term, 85 postmature and 32 with no menstrual history recorded. These were divided by the exact date and when classified as to the number of weeks pre- or postmature, fall into the following groups.

	Premature	Postmature
Less than 1 week	19	30
1-2 weeks	4	28
2-3 weeks	5	13
3-4 weeks	2	7
4-5 weeks	0	4
5-6 weeks	1	1
6-7 weeks	0	2

The chance of error in these histories is clearly shown here. It is very improbable that a large postmature baby would be encountered in a case premature from three to six weeks, from the menstrual history.

There were 151 vertex presentations and one breech. Of the vertex presentations the positions were as follows:

L.O.A.	81
L.O.P.	17
R.O.A.	15
R.O.P.	37
Brow	1

Of the 37 cases in the R.O.P. position, only 27 rotated spontaneously, two were pushed out of the pelvis and floating forceps applied, double application of the forceps (Scanzoni) in 6 cases, one cesarean and one delivered as an occipitoposterior with a resulting third degree tear. Of the 17 cases in the L.O.P. position, 14 rotated spontaneously, one delivered by version and two delivered as such, one had severe bruises about the head and neck but recovered, and the other was stillborn. Of the 54 cases in the occipitoposterior position there were two stillborn and two that died within 36 hours from birth injuries; two others received forceps injuries that resulted in abscess formation but recovered promptly, and another received bad injuries behind both ears—this one also apparently recovered after prolonged treatment; however, since that time it has developed muscle weaknesses and intracranial symptoms that will, no doubt, leave it an invalid for life.

The occipitoposterior position was found to increase directly with the weight, as follows:

4000 grams and above,—there were 37 cases in a total of 151, or 24.5 per cent
 4200 grams and above,—there were 24 cases in a total of 58, or 41.3 per cent
 4500 grams and above,—there were 13 cases in a total of 22, or 59.09 per cent

The average length of labor as recorded in 144 of the cases was 13 hours, 19 min., the primiparous averaging 19 hours, 57 min., and the multiparous 9 hours, 55 min. The average is high but is no more than one might expect in these large postmature babies. There were 82 cases that received morphine-scopolamine seminareosis, but no effort was made to check the influence on the length of labor as the great majority of these cases were primiparous women; however, this comparison has been carefully worked out in a recent paper by Krebs and Wilson of the Washington University School of Medicine.

Pituitrin was given in 42 of the cases, the amount varying from a single injection of m. 3 to as high as 11 injections averaging m. 4. In the latter case, the uterus relaxed immediately after delivery, considerable difficulty being experienced in stimulating contraction. It was necessary to give repeated doses of ergot and 1 c.c. of surgical pituitrin in addition to vigorous massage in order to control the bleeding and keep the uterus contracted. Forty-one of the babies breathed spontaneously; one of these died on the third day of pneu-

moma and another died on the first day from intracranial birth injury. The two deaths were cases that had been induced, the first with pituitrin alone and the second with pituitrin and bougies; however, the deaths cannot be attributed to the induction of labor.

The mode of delivery was as follows:

Forceps, low	72 cases
Forceps, mid	18 cases
Forceps, high	2 cases
Forceps, floating	2 cases
Cesarean section	1 case
Version	1 case
Spontaneous	56 cases
Double application	4 cases (included in forceps, low)

A double application of the forceps (Scanzoni) was done in four of the cases for occiputposterior, followed by low forceps. The version was done because of a persistent occiputposterior that could not be rotated easily. Floating forceps were applied in two instances after failure to rotate a persistent occiputposterior that was below the level of the spines. The head was pushed out of the pelvis, rotated with the hand and the forceps applied; delivery was then comparatively easy, with a 4145 and 4550 gram baby respectively. Both babies had forceps injuries that later resulted in abscess formation but responded readily to treatment. These bruises were apparently made while attempting a seemingly impossible Scanzoni maneuver. In these two cases it is questionable whether or not the proper choice of delivery was made; perhaps a version should have been done instead of the method used. However, both were primiparous women, both were overdue and a large postmature baby was expected in either case. The writer makes no attempt to recommend the use of either floating or high forceps, their use being seldom, if ever, indicated. There were forty-two episiotomies performed as follows:

Episiotomies, double	23
Episiotomies, single (R)	11
Episiotomies, single (L)	6
Episiotomies, midline	2

In the episiotomies, only one delivered spontaneously, two with floating forceps, two with high forceps, and the rest with mid and low forceps. The condition of the perineum was as follows:

Perineum intact	97 cases
First degree tear	35 cases
Second degree tear	19 cases
Third degree tear	1 case

Six of these tears were in addition to the episiotomies already done; two of the second degree type and four of the first.

Of these babies 135 breathed spontaneously but two died, the first on the second day, spina bifida, and the second on the fourth day with pneumonia. Nine were slightly cyanotic but breathed without resuscitation; three were asphyxiated, all of them being resuscitated with difficulty, and died 13, 14, and 36 hours respectively after birth.

There were five abnormalities as follows:

- (1) Cleft palate.
- (2) Club foot.
- (3) Club foot, malformation of the right and left leg and a spina bifida. (died)
- (4) Anomaly of the hand.
- (5) Anomaly of the heart. (died)

Injuries—Five.

- (1) Fracture of the clavicle.
- (2) Separation of the axis and 3rd. cervical vertebrae, (died)
- (3) Deep forceps injuries behind each ear, one lobe injured, (recovered but will, to a certain extent, be an invalid for life.)
- (4) Abscess over parietal bones from forceps injury, (recovered.)
- (5) Abscess over left temporal bone from forceps, (recovered.)

There were several minor injuries from forceps but all recovered readily. No other severe, permanent injuries have been brought to the attention of the department.

Five were stillborn. The histories of these along with the other fatal cases are as follows:

I. Stillborn—five.

(1) Record No. 2213. Mother white, age 29, grav. 1. Pelvic measurements—Sp. 25, Cr. 28, Tr. 31, Ext. Con. 19.5. No internal measurements given. Eleven days overdue from menstrual history. The patient was in labor 17 hours, 57 min. No pituitrin given, received morphia-hyosine. The position was occipito-posterior, (R) which rotated spontaneously. Midforceps was done, a second degree tear resulting. *Baby*: Male, weighing 4910 grams, 58 cm. long, with O.F. of 12 cm., and B.P. of 9 cm. No autopsy was obtained.

(2) Record No. 1150. Mother black, age 38, grav. 8, fullterm 6, miscarriages 1, all long labors, first instrumental. Pelvic measurements—Sp. 24.75, Cr. 26, Tr. 29.75, Ext. Conj. 17.25, and True Conj. 10.5; classified as generally contracted, slight. Thirty-seven days postmature from menstrual history. Patient received morphia-hyosine, no pituitrin given. Total labor 11 hrs. 20 min. Position L.O.A. High forceps, second degree tear resulting. *Baby*: Vertex. Forceps delivery attempted on the Out-Patient service, unsuccessful, brought to hospital immediately. High forceps applied, delivered with difficulty. No record as to how long baby had been dead. Weight 4010 gm., length 58 cm., O.F. 13 cm., B.P. 9.5 cm. Male.

Autopsy showed: 1. Atelectasis. 2. Caput Succedaneum.

(3) Record No. 3323. Mother white, age 47, grav. 10, all fullterm, no difficulties. Pelvic measurements—Sp. 26, Cr. 29, Tr. 30, Ext. Conj. 19, True Conj. 10.5, Tu. 9. No menstrual history. No pituitrin, no morphia, hyosine. Total labor 10 hrs. 55 min. Perineum intact. *Baby*: Female, L.O.P., rotated spontaneously, low forceps applied. The head was delivered with very little difficulty; however, the shoulders were extremely hard to deliver, the reason being that the baby had

a very large abdomen distended with fluid. Considerable force was used and the neck was broken during delivery. Weight 4050 gm., length 53 gm., O.F. 10 cm. B.P. 9 cm.

Autopsy Report: 1. Congenital anomaly of the heart with a defect of the interventricular septum at the base.
2. Separation of the axis and 3rd. cervical vertebra, with retro-pharyngeal hemorrhage.
3. Hemorrhagic pleural effusion (double)
4. Ascites, marked.

(4) Record No. 3111. Mother white, age 23, grav. 1. Exactly at term according to menstrual history. Delivered by caesarean section. This case was sent to the hospital from a neighboring St. Louis town. There, an attempt had been made to deliver the patient 24 hours before by forceps (no fetal movements felt by the patient since that time). On entrance to the hospital the soft parts were badly lacerated, the urinary meatus not being recognizable as such, all tissues were very edematous. Cesarean section was done, the cavity of the uterus was badly infected, a very foul odor present, and appeared gangrenous. Culture showed *B. coli*. The uterus was not removed and the abdomen was closed without drainage. The patient recovered although she had a very rough post-operative course. *Baby:* Male, position R.O.P., weight 4600 gm., length 56.5 cm., O.F. 13 cm., B.P. 9.5 cm.

Autopsy Report: 1. Compression of brain with a fracture of the skull.
2. Fracture of lower maxilla, right.
3. Birth hemorrhage, brain and right sternocleidomastoid muscle.
4. Congestion of all viscera.

(5) Record No. 1891. Mother white, age 37, grav. 7. No pregnancy record. Morphia-hyoscine. No pituitrin. Total hours of labor not recorded. First degree tear plus an episiotomy, lateral. *Baby:* Male. Brow presentation. Forceps, low. Weight 5000 gm., length 59 cm., O.F. 13.25, B.P. 9.5 cm.

Autopsy Report: 1. Deformity of the head; extensive subcutaneous hemorrhage—head, neck and shoulders. 2. Meningocele.

Note: Mother developed a vesico-vaginal fistula.

II. Cases that died during the first fourteen days of life—five.

(1) Record No. 2148. Mother white, age 28, grav. 4. Two fullterm babies and one miscarriage. No difficulties with previous deliveries. Three days post-mature from menstrual history. Pelvic measurements: Sp. 24, Cr. 29, Tr. 31, Ext. Conj. 19, True Conj. 9.5, Tu. 10.5. Patient had nine injections of pituitrin over a period of twenty-four hours because of induction of labor. This induction of labor was assisted by the introduction of two bougies into the uterus and the pains stimulated by the use of pituitrin. Total number of hours of labor not recorded. No perineal injury. *Baby:* Female, weight 4100 gm., length 55 cm., O.F. 13 cm., B.P. 9 cm. Midforceps were applied and the baby delivered with considerable difficulty. The fetal heart was good up to the time of delivery. The baby was asphyxiated and resuscitated with difficulty; died 13 hours after birth. No autopsy, but the baby had marked signs of intracranial injury.

(2) Record No. 1731. Mother white, age 24, Grav. 1. No pregnancy record of menses or pelvis. Morphia-hyoscine was given and one single dose of pituitrin M5. The patient was in labor 19 hours and 40 minutes, and had a double episiotomy and low forceps. *Baby:* Male, weight 4250 gm., length 49 cm., O.F. 13 cm., B.P. 8.75 cm. L.O.A. position. Baby died on the third day from pneumonia. No autopsy. Condition at birth excellent.

(3) Record No. 3174. Mother white, age 20, grav. 1. Pelvic measurements—Sp. 24, Cr. 28, Tr. 30, Ext. Conj. 20, True Conj. 10.5. Twenty days postmature from the menstrual history. Total labor 25 hours., 5 min. Morphia-hyoscine. No pituitrin. Double episiotomy, with a 2nd degree tear in addition. *Baby*: Male, weight 4190 gm., length 50 cm., O.F. 13 cm., B.P. 10 cm. R.O.P. position that rotated spontaneously. Low forceps. Baby breathed spontaneously but died twenty-four hours later.

Autopsy Report: 1. Overterm baby. 2. Spina bifida. 3. Congenital anomalies of the lower extremities. (a) Malformation of the foot, (Rt.). (b) Malformation of the leg, (Rt. & Lt.).

(4) Record No. 1347. Mother white, age 38, grav. 8, there being seven full-term babies, patient giving a history of having carried most of these babies over time, averaging 2-3 weeks. No pelvic measurements were given. Patient was three days premature according to the menstrual history. No pituitrin or morphia-hyoscine given. Was in labor six hours. Position L.O.P., which rotated spontaneously, and was delivered by difficult midforceps with a 1st. degree tear. *Baby*: Male, weight 4600 gm., length 54 cm., O.F. 12.5 cm., B.P. 9.5 cm. The baby had several bruises about the face and head, but no marked depression of any sort. After difficult resuscitation the baby breathed fairly well but began having convulsions eight hours after birth and died twenty-four hours later. No autopsy obtained, but the picture was quite typical of an intracranial injury.

(5) Record No. 1094. Mother white, age 25, grav. 3, there being one miscarriage and one fullterm baby, the latter being stillborn after a very difficult forceps delivery. Pelvic measurements—Sp. 25, Cr. 28, Tr. 34, Ext. Conj. 20, and True Conj. 9.5, the pelvis being classified as simple flat. From the menstrual history patient was four days postmature. This patient had no morphia-hyoscine, no pituitrin, and a total length of labor of 18 hrs., and 7 min. Position L.O.P. with high forceps applied in the L.O.T. position and delivered; a 2nd. degree tear resulting. *Baby*: Male, weight 4600 grams, length 56 cm., O.F. 12 cm., and B.P. 8.5 cm. The baby was asphyxiated at the time of delivery, breathed fairly well after one hour of resuscitation, but died 14 hours after birth. Baby had signs of intracranial injury. No autopsy report.

The above ten fatalities give an infant mortality of 6.5 per cent as compared with an infant mortality of 2.16 per cent for the second thousand cases delivered at Barnes Hospital, weighing over 2500 gm., the mortality being only 0.73 per cent for the private cases in the same series (Krebs, Wilson).

The average measurement for the occipitofrontal diameter was 12.006 cm., and 9.4 cm., for the biparietal diameter. The average weight was 4262.6 grams, length 51.96 cm., and the average initial loss of weight was 423.9 grams, being almost 10 per cent, which is much above the average. This initial loss of weight increased with the larger babies, as one would expect. In the 58 cases weighing 4200 grams or more, the average weight was 4463 gm., and the average initial loss of weight 463 gm. or 10.3 per cent, which is a very high average. A three way comparison between the head measurements, the length, and the weight cannot be made, because the weight was the only one that was constantly taken by the same standard. These weights were taken by the nursing staff and always on the same scales

and can be relied upon as being accurate, while the measurements were made by many different people, including doctors and medical students. The average length and head measurement is at the upper border of the normal limits as given by most men, however, both can be taken as belonging to the oversized, or postmature child; but these averages are not in keeping with the large weights of these infants which are quite decidedly in the postmature class.

A comparison between the fatalities and entire series can be made from the following table:

AVERAGES	NUMBER OF CMS.	WEIGHT	LENGTH	O.F.	B.P.
Fatalities	10	4421	54.8	12.47	9.22
Stillborn	5	4514	56.8	12.25	9.3
Died	5	4328	52.8	12.7	9.15
Series	152	4262.9	51.11	12.006	9.4

The most striking thing in the above is the comparison of the weight and length of the stillborns to that of the general series. The length especially is very much above the general average. This table very closely shows the dangers to be expected when the patient is allowed to go over time.

There were 64 private cases and 88 on the ward, the private cases making up 42.1 per cent, an increase of 20 per cent over the normal ratio of private cases to the total number. During the same period of time there were 2687 deliveries at Barnes Hospital, of which number 770 were private cases, or 22.2 per cent. There were 148 white and 4 colored cases, or 2.6 per cent colored. Of this number 92 were boys and 60 girls, 60.5 per cent boys; the percentage of males over females increasing to 65.5 per cent as the weight increased, there being 38 boys and 20 girls among those cases weighing 4200 gm. or more.

After going over these cases in detail, observing the increased fetal mortality, the long difficult labors and the injuries both to the mothers and the babies, one is immediately impressed by the poorer results obtained in the delivery of these large postmature babies. That there could be much improvement in the handling of this particular type of case goes without saying. It is a problem that should be carefully considered by every obstetrician, and is truly work for the highly specialized man.

To get at the solution of this problem, two things are of great importance: First, how may a diagnosis be made in these cases, and second, how should they be treated?

The diagnosis should be considered in two ways: First, anticipating the condition from past pregnancies, and second, the actual diag-

nosis of the existing condition. Thus each case should be carefully studied, not only during the pregnancy in question, but also going into the history of previous pregnancies and ascertaining whether there was a disproportion between the pelvis and the fetus, and if so, whether it was due to an oversized fetus or a small pelvis, or a combination of the two. Some of the cases in this series gave a definite history of large postmature children in previous pregnancies. Such cases should be given particular attention, and every means employed to determine the period of gestation and the size of the fetus. The menstrual history should always be carefully gone into but not too much importance attached to it, its accuracy depending upon the intelligence of the patient, and even then mistakes are very frequent. Mensuration *in utero* should always be done and the technique used perfected. Every case, of course, should be watched carefully throughout pregnancy, but especially 6-8 weeks before the expected date of confinement. Head measurements should be begun about 4-5 weeks before the estimated termination of pregnancy and carefully compared as the growth progresses. The height of the uterus should also be measured from time to time to note the progressive growth of the fetus, or to check any death in the uterus that may occur. These measurements linked with the menstrual history given are of great value in the diagnosis of the size of the fetus and its comparison to the period of gestation, as it progresses to term. The word "term," as brought out by others, covers a multitude of fluctuating dates, but, nevertheless, is valuable when used as a resultant gained from the comparison of the menstrual history with the fetal measurements *in utero*.

Treatment should vary with the individual case. In view of the greater frequency of large babies in well-to-do classes, a fact that is universally accepted, it is quite apparent that some regime should be instituted to control two factors in the life of these mothers, namely, diet and exercise. Which is of the greater importance is an open question, but until this question has been thoroughly worked out, both should be regulated. The problem of exercise, of course, presents less worry to the obstetrician and may consist of any light exercise, varying with the different patients and the environment. The exercise should never be too vigorous and not indulged in to the point of fatigue, and should also vary as the pregnancy progresses. In other words, the patient should not be allowed to spend her time in nonexercising luxurious home comforts, that so often predispose to obesity in either sex, adults or children, or even, oftentimes, a predisposing factor in the etiology of many diseases. On the other hand, the diet presents a much more complicated problem and at present is a subject on which very few agree. Does overeating on the

part of the mother stimulate the fetus to overdevelopment, and can this development be retarded by regulating the diet, especially the carbohydrate and fluid intake during the pregnancy? A very striking observation has been made in many of these cases, that is, the mother had a marked tendency to obesity. Certainly diet would have had a marked influence on the control of this superfluous fat in the mother and it is logical to believe that it would have indirectly influenced the growth of the child *in utero*.

Prochownik in 1889 presented a diet for which he claimed some very excellent results, in that he was able to control the fat growth in the fetus, thereby preventing an obese, flabby infant that is so often encountered.

Prochownik's diet, poor in liquids and carbohydrates and rich in proteins, is as follows:

Breakfast: A small cup of coffee, biscuit or bread with butter.

Lunch: Meat, egg, fish, green vegetables prepared in fat, salad and cheese.

Dinner: Same as lunch with bread and butter.

Water, soups, potatoes, puddings, sugar and beer were excluded. A limited amount of light wine was taken. If the patient desired, small quantities of milk and water were substituted for alcohol, along with fresh fruit. A small cup of coffee or tea was allowed in the afternoon, with a little bread and one egg. The total quantity of fluid was not to exceed 500 c.c. or the calories 2000 per day.

Prochownik did not claim any structural change in the infants. These infants were of normal length, average head measurements, showed all the signs of maturity, but showed a marked deficiency in fat. He has had many supporters, Reed and Paton being the most ardent, with many warm and lukewarm followers. Among the non-supporters of this diet are: Bondi, Fraenkel, Ehrenfest and others. They either claim injurious effects to the mother from the diet, starvation or a tendency to toxemia, or else that diet plays no part in the growth of the fetus, the latter being only a parasite.

Ehrenfest speaks of the possibility of heredity playing a more important rôle, and explains these large postmature children among the wealthier classes to be the result of a more careful selection of the mate. Heredity is bound to play a part in the weight of the child, its bony structure and racial characteristics, but it is the control of this excess adipose tissue or increased water content in the offspring of any mother, any race, in any walk of life, that is of importance and that interested Prochownik and is still holding the interest of the obstetrician of today. A careful selection of the mate in the well-to-do classes is not based on physique, but rather on social standing, this being all the more pronounced as the well-to-do classes approach

the aristocracies or royalties. Who would look for physical perfection among these classes? Therefore it does seem a question of the mode of living, including both diet and exercise, and that Prochownik's theory was at least cast along the proper lines, although probably carried to the extreme. An athlete in training does not feast on pastries and lounge in luxurious comfort throughout the day, neither does he carry any excess fat when properly trained. Then, in the pregnant woman, rich, nourishing foods should be avoided, or used in moderation, as indicated by her condition throughout pregnancy, and not beyond physiological needs.

Perhaps an overdeveloped fetus tends to prolong gestation, as many cases are encountered where the prolonged gestation, according to the history, is much too short to account for the excessive size of the child. This could only be worked out by carefully supervised pregnancies, accurate histories, and mensuration of the child *in utero*.

If there has been no previous history of large babies, then the case can be progressively watched and the growth of the fetus checked from time to time. When the fetus has reached maturity, reckoned by the height of the fundus, length of the child, head measurements and menstrual history, then the question of what to do presents itself. It certainly would be a deplorable thing to recommend widespread induction of labor in these cases, and again it has been proven that it is very unwise to allow some of these cases to wait for the delayed labor to take place. Therefore, every case should be treated individually. If the child is mature and entering the postmature class and associated with a large roomy pelvis, within the normal limits, or a justomajor pelvis, then induction of labor should be postponed until the fetal proportions are encroaching upon the pelvic diameters. However, if the pelvis is normal, small, or contracted, then labor should be induced at the proper time, whether premature, mature or postmature.

Perhaps induction of labor would have given better results in many cases in the present series, but was carried out in only eight instances. The choice of the method for induction should again be made as the cases present themselves, with no fixed routine employed. The following methods have given good results on our service: Pituitrin alone, castor oil alone, pituitrin in combination with castor oil, pituitrin and bongies, bongies alone, and the Voorhees bag. Each method has its advantages and indications and gives very good results in the properly selected cases.

CONCLUSIONS

From the study of this series and a review of the literature the following may be concluded:

1. That there is marked difficulty encountered in the delivery of the large postmature babies, with a higher percentage of injury to the mothers and a higher mortality and morbidity among the infants.

2. That the occipitoposterior position is encountered more frequently, rotates less readily and is rotated by the Scanzoni maneuver with more difficulty.

3. That the choice of delivery is a greater problem and its execution more strenuous to all parties concerned.

4. That the cause for the prolongation of the period of gestation is not definitely known and the overdeveloped fetus may be a predisposing factor.

313 WALL BUILDING.

A CASE OF PREGNANCY IN A DOUBLE UTERUS (UTERUS DIDELPHYS)*

BY JOSEPH J. MUNDELL, M.D., WASHINGTON, D. C.

CASE reports of double uterus or like malformations in the gynecologic literature are not uncommon, indeed they are rather numerous, but cases of full term pregnancy in a true double uterus, or uterus didelphys, are exceptionally rare; probably not more than three hundred well authenticated cases have so far been recorded. Of course, not all rare conditions are worthy of note, but on the score of rarity and interest is this report offered.

While members of this Society may have encountered such a condition, none has taken the trouble to report it, or at least my careful review of the literature in the Surgeon General's library has failed to reveal it. Also, so far as I could find in my search, but six cases of nonpregnant uterus didelphys have been reported by members of this Society, namely: Drs. W. M. Sprigg,¹ W. P. Carr,² S. R. Karpeles,³ (two cases) Frank Leech,⁴ and I. S. Stone.⁵ Dr. G. Brown Miller tells me he has seen two or three such cases. I am sure other members have probably run across the condition occasionally, and I know they have often seen cases of bicornate uterus and such other malformations, but the case I am reporting is a true double uterus and is comparatively rare.

A brief consideration of the origin of this malformation may not be out of place. It is due to an arrest of embryonic development. As you know, the genital tract is formed by the partial fusion of the right with the left müllerian duct. They form in four to six weeks and begin to fuse about the sixth to eighth week; the lower third forms the vagina, the middle, the uterus, and the upper unfused

*Read at a meeting of the District of Columbia Medical Society, February 14, 1923.

third, the tubes. It is failure of the two lower thirds to fuse properly which results in the malformation such as we have under consideration. Complete failure to unite results in uterus didelphys or true double uterus, double cervix and double vagina. Partial fusion of the middle third results in various malformations, types of which have been described as: uterus unicornis, uterus pseudodidelphys, uterus bicornis duplex, uterus bicornis septus, uterus bicornis subseptus, uterus bicornis unicollis, uterus bicornis unicollis with rudimentary horn.

Pregnancy developing in one of the malformed uteri has resulted in many interesting experiences. As is well known, pregnancy in a rudimentary horn is difficult to diagnose from ectopic pregnancy, and its mortality in some series of cases is as high as 88 per cent. It is well recognized that in pregnancy in a rudimentary horn rupture is prone to occur.

There are some cases reported of each uterus being pregnant simultaneously. Cowles⁶ reports a case in which hysterectomy had been performed by another operator immediately following cesarean section and the patient was told that she could have no more children. One year later on this same patient Cowles delivered another full term baby by cesarean section. Rongy⁷ reports a case in which the woman miscarried at the fourth month, and five months later gave birth to a full term baby. Several cases have been reported in which pregnancy was encountered in one horn in which no external communication could be demonstrated. Dr. Howard Kelly⁸ reports such a case. Debierre⁹ reported a case of double uterus in which the woman gave birth to a full term baby July 16, 1870, and another full term baby on October 31 the same year.

It has been suggested that this condition might explain some of the many cases of superfetation which, from time to time, have been reported. J. C. Hirst¹⁰ reports the case in which a three months mummified fetus was retained in one horn while the other became the site of two full term pregnancies.

Brooks Wells¹¹ reports a case in which the septum remained intact after seventeen labors. Voigt and Thilow¹² have reported cases of triple uterus, diagnosed at operation. Dr. Sprigg's report states that the alternate uteri menstruated on alternate months; this he tested out on several occasions. Dr. G. Brown Miller's case had gonorrhea of one vagina with a pus tube on the corresponding side, while the opposite vagina and tube were apparently free from the disease. Another case report, the reference of which I have lost, related a similar condition, and that one male having contact contracted a Neisserian infection, while another a few days later, who evidently had access to the other vagina, was more fortunate.

This malformation apparently does not lessen fecundity for numerous cases are cited of women becoming pregnant many times.

There are several reports in which one uterus has been amputated and normal pregnancy has followed in the remaining uterus. Polak¹³ states that following delivery in these cases hysterectomy should be performed, because bad drainage is apt to ensue. This is not borne

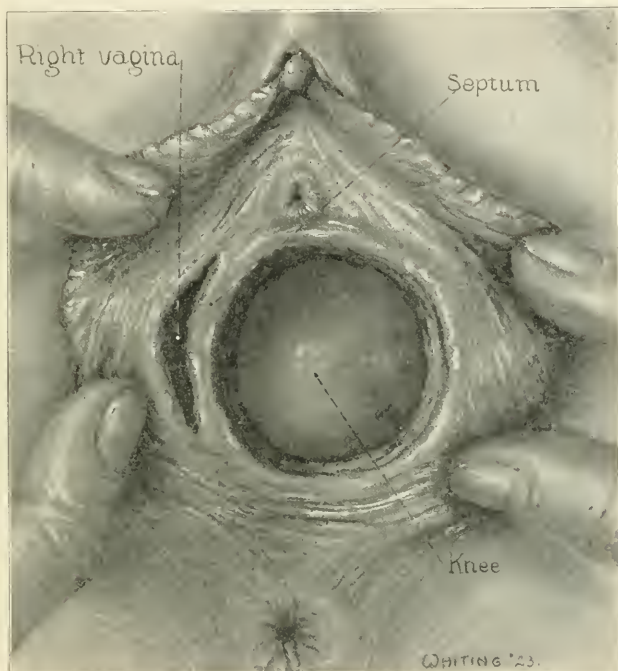


Fig. 1.

out by perusal of the histories of the majority of the cases; certainly not in mine.

In the vast majority of cases of uterus didelphys it seems that labor progressed normally. In a large percentage of cases cesarean section has been done, though the indications for the same were not always clearly stated. Humpstone¹⁴ records a case in which obstruction to labor was due to the septum, and this was also given as the cause of several others. Rongy,⁷ A. W. White,¹⁵ Ronsheim,¹⁶ Reynes,¹⁷ Los Casos dos Santos,¹⁸ Finlay Edwards,¹⁹ Borinsky,²⁰ and Van de

Velde²¹ each report a case in which cesarean section was necessary on account of the nonpregnant uterus obstructing or preventing the head from engaging. That is what occurred in my case, the report of which follows:

Mrs. C., age twenty-six, a primigravida, well developed, strong and healthy, presented herself on May 10, 1921, to engage me for her confinement which was estimated to be due about August 2, 1921. Outside of tonsillectomy in 1916 she had never been ill, always had enjoyed robust health, and her menstrual history had always been normal. Upon examination on this date the anomaly was discovered. The

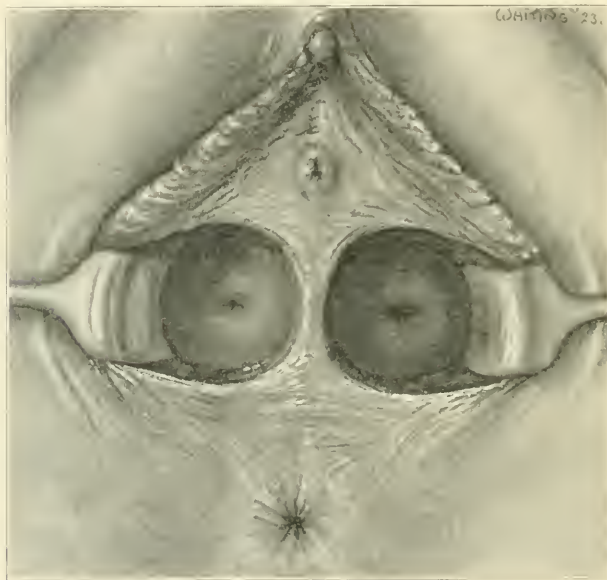


Fig. 2.

vulva appears to be normal but upon separating the lips of the vulva a vertical septum can be demonstrated, separating the vagina into two equal cavities. (Fig. 1.) The septum extends intact right up to the vault of the vagina, being attached throughout its course to both the anterior and posterior vaginal walls. There is a perfectly normal cervix in each vagina (Fig. 2), though the right cervix and uterus occupy a lower position in the pelvis than the left cervix and uterus. At this time I could of course map out the pregnant uterus and also I could feel another mass about the size of a fist, which I took to be the other uterus.

The patient, whose pelvic measurements were normal, passed through an uneventful pregnancy, normal in every respect, and went into labor at 5 A.M. August 8, 1921. Ineffectual first stage pains continued until 7 P.M. August 9, when the pains became harder and recurred at five minute intervals all night, the membranes

rupturing about midnight (August 9). At 11 A.M. August 10, after fifty-four hours labor, the last twelve of which had been rather hard in spite of frequent injections of morphine, the cervix was only dilated about the size of a half dollar, and the head was not engaged, the nonpregnant uterus preventing its engagement. At this time I sought the counsel of Dr. John F. Moran, who advised cesarean section on account of the following indications: the evident obstruction by the nonpregnant uterus, the ruptured membranes, the fear of rupture of the uterus under stress of such a long labor. Cesarean was done at 1 P.M. August 10, fifty-six hours after onset of labor, when a male child weighing six pounds, nine ounces was delivered. The patient had an uneventful puerperium, being discharged from the hospital on the seventeenth day, August 27, 1921.

At the operation, upon opening the abdomen, the full term pregnant uterus

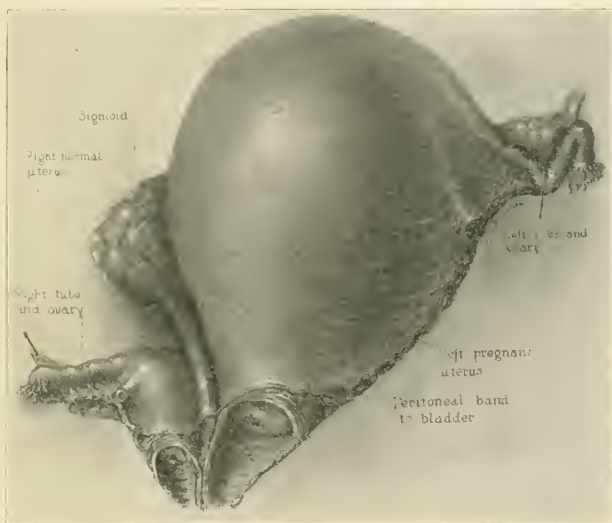


Fig. 3.

was encountered occupying the abdominal cavity. After the baby was extracted and the uterus sutured the relations were easily demonstrated (Fig. 3). A normal tube and ovary came off the right side of the right uterus and a normal tube and ovary came off the left side of the left uterus, in their normal situation. The right nonpregnant uterus was the size of a doubled fist and was low down in the pelvis. The uteri were connected only by the vaginal vault. A broad thick band of peritoneum came off the sigmoid about six inches above the vaginal wall, passing forward through the gap between the uteri and fused with the peritoneum covering the bladder.

At an examination on February 10, 1922, both uteri were mapped out very plainly, the left being slightly larger than the right, and a sound was introduced into each uterus about two and one half inches.

After the birth of the baby menstruation took place for the first and only time

on February 17, 1922, when she again conceived, confinement estimated to be due November 24, 1922. This pregnancy also was normal. Later in pregnancy examination showed the left cervix to be softer than the right, and the same hard mass was felt in the right side of the pelvis. Therefore, I assumed that the left uterus was again the site of the pregnancy, and this assumption was later found to be correct.

As I planned to again cesareanize her I particularly gave instructions that I should be notified immediately upon the first signs of labor. Notwithstanding my positive instructions this is what happened: The membranes ruptured at 10:30 P.M. December 7, 1922, and pains began two hours later, but because they were slight the patient did not call me until 9:30 A.M. the next morning, December 8. She entered the hospital at 11 A.M. Upon examination one knee was found presenting through the cervix and well down into the vagina. As I felt that this somewhat complicated matters, I again sought the counsel of Dr. Moran who advised cesarean in spite of this turn in affairs, because it was thought that the danger of rupture was greater now than in the first delivery, and also the probability of the non-pregnant uterus obstructing the aftercoming head. Thereupon I did the second cesarean at 1 P.M., by which time the knee could be seen plainly by separating the labia. (Fig. 1.) The knee and the vagina were bathed freely with alcohol before opening the abdomen. The pregnancy was found to be in the same uterus as before, and the uterine scar was smooth and could barely be seen, though a large piece of omentum was adherent to a portion of it. Of course the same relations as noted above were observed. A girl baby weighing seven pounds seven ounces, was delivered. The second puerperium was also normal. The temperature reached 101.2° on the second day, 101.6° on the seventh day, 101.2° on the eighth day; on all other days it was not over 99.6°. The patient was discharged on the eighteenth day, December 26, 1922. On examination January 23, 1923, the patient was found to be in excellent condition.

REFERENCES

- (1) *Am. Jour. Obst.*, 1895, xxxii, 78. (2) *Washington Med. Ann.*, 1908, vii, 174. (3) *Ibid.*, 1918-19, xvii, 95. (4) *Ibid.*, 1918-19, xvii, 97. (5) *Ibid.*, 1918-19, xvii, 98. (6) *AM. JOUR. OBST. AND GYNEC.*, 1922, iii, 652. (7) *AM. JOUR. OBST. AND GYNEC.*, 1922, iii, 654. (8) Kelly: *Operative Gynecology*, 1906, i, 208. (9) Reported by W. R. Jackson, *New York Med. Jour.*, 1916, civ, 788. (10) *Am. Jour. Obst.*, 1918, lxxviii, 472. (11) *Ibid.*, 1893, xxvii, 329. (12) Reported by W. R. Jackson (9). (13) *Am. Jour. Obst.*, 1917, lxx, 849. (14) *Ibid.* (15) *Ibid.*, p. 850. (16) *Ibid.*, p. 851. (17) *Bull. Soc. d'Obst. de Paris*, 1902, vii, 280. (18) *Ztschr. f. Geburtsh. u. Gynäk.*, 1887-8, xiv, 140. (19) Reported by Van de Velde, *Monatschr. f. Geburtsh. u. Gynäk.*, 1915, xlii, 307. (20) *Arch. f. Gynäk.*, 1876, x, 145. (21) *Monatschr. f. Geburtsh. u. Gynäk.*, 1915, xlii, 307.

1616 RHODE ISLAND AVENUE, U. W.

INSUFFLATION OF FALLOPIAN TUBES BY AIR AND HAND BULB

A SUPPLEMENTARY COMMUNICATION

BY ROBERT L. DICKINSON, M.D., NEW YORK, N. Y.

AN illustration is needed to supplement my communication printed in the August, 1922, issue of the AMERICAN JOURNAL OF OBSTETRICS AND GYNECOLOGY (and the reference in the July number of 1923, page 113), in order to depict the apparatus shown at the meeting of the New York Obstetrical Society, held March 14, 1922. The figure herewith is self-explanatory, the sole modification being the shoulder on the glass pipette, which is only a year old. Either the glass cannula or the standard intrauterine tube of Rubin is connected by a *T* with any portable manometer of the sort used in testing blood pressure, and with a bulb. This bulb may be about an inch in diameter and 20 c.c. capacity, or of the kind used with the sphygmomanometer. The metal cannula of Rubin I have used frequently, but the sliding rubber collar that corks the external os obscures the view and is, for most work, unduly large, though it has an advantage in being unbreakable, and, in one form, carries lateral openings. Unless one uses the malleable variety two shapes are essential, one nearly straight, and one with a curve to fit acute ante flexion. The glass uterine cannula bears a tapering glass shoulder, which, being transparent, allows observation of fit and position and regurgitation. A small quantity of lubricant is placed on the shoulder before introduction of the tube, and this seal at the external os demonstrates bubbles if the pressure works air back through the canal. This is simpler than flooding the vagina with fluid.

I have now confirmed the air test by following it up immediately with the full Rubin gas test a sufficient number of times to feel satisfied that the former fulfils all requirements save measurement of the exact quantity insufflated. This, however, seems unimportant. Passage of a gas occurs at a given pressure, or else it does not occur, and this is the sum and substance of the Rubin test.

The drawbacks and risks have not been dwelt upon. It is painful and the pain may last for hours. The danger may be said to be in proportion to the skill in diagnosis and the conscience of the operator. The chief risk is that of blowing infective material into the peritoneal cavity and the lesser one, peritoneal shock. I hear of one grave collapse having occurred in a prominent clinic.

Requisite Preliminaries.—Semen invariably to be proved, by recent microscopic test on a full ejaculation, to be normal and active and free from pus; interval of nine months since marriage or since cessation of contraceptive measures; bimanual examination by the operator, with empty bladder and fully loosened clothing; in cases of tight

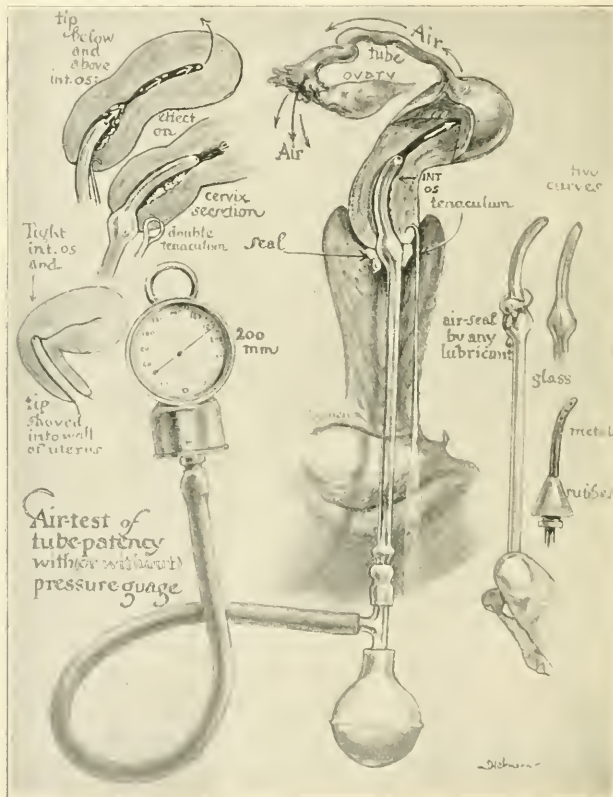


FIG. 1.

internal os, dilatation; with any endotrachelitis present, a cure first.

Contraindications.—Active inflammations of any degree or in the recent history; bad period as sequel of first insufflation (one case), or pelvic pain and tenderness lasting more than one day. Among chronic disabilities, purulent cervical discharge and raw cervix; infected

arethral glands; pus tubes and pelvic exudates; fixed retroversion and flexion; and postabortion history and findings suggestive of lingering streptococcus infection. Among *general* contraindications, recent or impending menstruation; the two or three days following coitus; heart disease, facile syncope and epilepsy.

Technic of Insufflation.—

Time: Half-way between periods, and three days since coitus.

Outfit: Lubricant, bivalve and Sims' specula, tenaculum, swabs, tincture of iodine, cannula-bulb-manometer.

Empty bladder, corsets off, waist bands loosened. Careful bimanual examination. Dorsal posture provided uterus is very mobile and not anteфлекed, or with retroverted uterus, if it is mobile.

Sims' posture the general rule; with anteфлекion, Sims' posture always; bivalve may be used in Sims' posture.

Low pressure at first trial (140 to 150), or in sensitive patients or along the border line of indications. Repetition a month later up to 200 mm. Iodine swab of cervical canal, with no fluid left in canal; seizure of cervix with single or double tenaculum; ring of lubricant on the upper shoulder of cannula; passage of cannula till tip reaches beyond internal os and shoulder corks internal os; compression of bulb by gynecologist, his eye on the external os to watch for exit of bubbles. Nurse watches manometer and calls off its reading in order that the gynecologist may regulate rate of flow, the highest reading not to exceed 200 mm; rate of flow 100 mm. to 20 seconds.

Rest, then repeat bimanual examination to determine whether a tube has been distended (this last is the suggestion of W. H. Cary); a pneumosalpinx is found if the fimbriae only are closed, in certain cases. Acetanilid or aspirin or codeine tablet if necessary; directions to go home and remain quiet.

Society Transactions

TRANSACTIONS OF THE AMERICAN GYNECOLOGICAL SOCIETY

FORTY-EIGHTH ANNUAL MEETING

HOT SPRINGS, VIRGINIA, MAY 21-23, 1923

(Continued from page 500, October issue.)

DR. GEORGE GRAY WARD, New York, N. Y., described a case of **Reconstruction of the Urethra after Complete Loss, Complicating an Extensive Vesico-Vaginal Fistula**, as follows:

Mrs. M. I., aged twenty-three years, married two years, came to the Woman's Hospital in October, 1920, with complete urinary incontinence dating from her labor in December, 1919, when she had a full term baby delivered by craniotomy. During delivery the cervix was badly torn and a traumatic vesicovaginal fistula was produced. The patient subsequently entered the New York Lying-In Hospital in January, 1920, suffering from a chronic pelvic sepsis and amenorrhea. Later an attempt was made for the repair of the fistula. I am indebted to Dr. G. W. Kosmak for the details of the history while in that institution as follows:—"Exploration under anesthesia showed the fistula about one inch in diameter including the posterior portion of the urethra and involving the trigone. The vault of the vagina showed no opening communicating with the uterus and no trace of the cervix. It was full of scar tissue. It was impossible to separate the bladder wall from the uterus because of the inability to locate any cervical opening. Wide lateral incisions in the lower portion of the vagina failed to give sufficient room to thoroughly expose the operative field. An exploratory laparotomy disclosed a small well-involuted uterus with normal tubes and ovaries. The lower segment of the uterus and the bladder were firmly imbedded in a mass of scar tissue so that the uterus could not be pulled upward. An incision was made transversely in the fundus and a sound carefully introduced in an attempt to find the outlet. This was accomplished with moderate pressure and a soft rubber catheter pushed through this artificial opening in the vagina and left in situ. The fundus uteri was closed with interrupted gut sutures, no further attempt to close the fistula was made. In May, 1920 on reexamination, the uterus was found anteverted, not freely movable, apparently slightly enlarged. The patient had had a menstrual flow lasting twenty-four hours two weeks previously. The fistula seemed reduced in size."

Evidently the stenosis of the uterine canal had been relieved by this operation as the patient gave us a history of regular menstruation without discomfort since that time. Unfortunately, our difficulties were increased because the patient was very short and very obese, weighing over two hundred pounds.

Our examination showed a vesicovaginal fistula at the site of the trigone and involving the urethra, nearly as large as a twenty-five cent piece, with dense scar tissue surrounding the same.

On October 26, 1920 I operated as follows:—A typical Schuchardt incision was

made extending from the vault of the vagina to the coccyx. This gave an access without which it would scarcely have been possible to reach the parts involved. Incisions were then made through the scar tissue of the vaginal vault to the subpubic arch, and above, and on either side of the site of the urethra, thus loosening the tissues in order to allow approximation of the margins of the fistula without tension. The vaginal edges of the fistula were dissected free from the bladder edges for approximately one-quarter to one-half an inch and the bladder opening united with interrupted No. 1 tanned gut sutures. Silkworm gut sutures closed the vaginal edges, and the incisions in the scar tissue were closed in the reverse direction with catgut. On the left side of the vaginal vault it was impossible to close the incision in the scar tissue owing to the tension, and it was left to granulate. A self-retaining catheter was inserted, and the Schuehardt incision was closed. No attempt was made to construct a urethra.

On November 23, 1920, the patient was again anesthetized and carefully examined. It was found that the fistula was now reduced to a diameter of about a quarter of an inch and was just posterior to the site of the internal meatus. The margins of this opening were denuded and interrupted sutures passed to narrow the orifice in the hope of increasing the vesical control. The result of the operation was partially satisfactory, as the patient could remain dry while in the recumbent posture until the bladder became sufficiently filled to reach the level of the orifice at the neck of the bladder. By getting up to empty her bladder two or three times at night she was able to keep dry, and she felt that a great gain over her previous distressing state had been accomplished. She was anxious for a further attempt to give her better control. She was readmitted to the hospital and the next operation was done on January 9, 1922, when an effort was made to construct a urethra.

The inferior urethral wall was entirely absent, although the superior wall with its mucosa was present with fragmentary margins along each lateral wall. There was an entire absence of urethra or mucosa around the neck of the bladder at the site of the internal meatus. A scalpel was used to undermine the edges of each lateral wall of the superior urethra that remained, and the loosened flaps thus obtained were made to encircle a small rubber catheter which was passed into the opening in the bladder, and the edges were united with tanned gut sutures. The cut edges of the mucous membrane of the vestibule and anterior vaginal wall were then brought together over the new urethra with silkworm gut sutures. The result of this operation was a complete failure as the tissues sloughed away, and the patient was discharged in the same condition as on her second admission.

She was admitted to the hospital for the third time on October 25, 1922 and I operated on November 8, 1922 with the technic to be described, with a most satisfactory result.

In the first attempt I was guided by the method successfully employed by C. P. Noble, and in studying the problem at the second operation I determined to try the technic of Kelly, of making a tunnel under the vestibule and of drawing through it a long flap, dissected from the anterior vaginal wall with its end left attached to the vesical opening. I had grave doubts as to my being able to employ this ingenious procedure owing to the fact that the anterior vaginal tissues from which I should have to obtain this flap were thin and made up largely of scar tissue, the result of my original operation for the closure of the extensive defect in the trigone of the bladder. My fears were justified as, after I had succeeded in dissecting up a flap sufficient for my purpose, the bladder wall underneath was so extremely thin that it was not possible to leave it to granulate, and neither was it possible to approximate the lateral edges of the vaginal wound, as the denuded surface was too wide.

The suggestion of Noble to use the labium minus as an attached flap in this

region seemed worth trying and I, therefore, resolved to employ this tissue to cover this denuded and weakened area at the base of the bladder. After first making a tunnel with a scalpel behind the original site of the urethra and drawing the vaginal flap through it and suturing it in place, I accordingly incised the inner surface of the right labium minus at its attachment to the vestibule from the region of the clitoris to its base, and then unfolded it by careful dissection. This gave me an ample flap attached by a broad base which was easily brought in place over the denuded area of the vaginal wall and was sutured in position with silkworm gut. The upper angle of the incision where the labia was detached was then sutured together. A very small soft rubber catheter (not a mushroom) was inserted in the new urethra and fastened with a suture.

The tissues healed without difficulty and the result was most satisfactory, as the patient is dry in both the recumbent and erect posture and can urinate without difficulty.

DISCUSSION

DR. LILLIAN K. P. FARRAR, NEW YORK CITY.—The result was absolutely satisfactory to both patient and the operator but as an afterthought it occurred to me to take more of the mucous membrane on either side and unite the two edges, so as to make a complete lining with the mucous membrane too.

DR. GEORGE W. DOBBIN, BALTIMORE, MARYLAND (by invitation).—Dr. Ward's paper recalls to my mind a case I have at present under observation. The patient, a primipara, had been under my care throughout her pregnancy. She had a normal pelvis and about eight weeks ago went into labor with what appeared to be a normal sized child in an R. O. P. position. Cervical dilatation was just beginning and, as the head was well engaged in the pelvic brim I did not anticipate any great dystocia.

She had a long slow first stage, and the next morning I made an examination under anesthesia to ascertain whether or not labor could occur through the natural passages, or whether we were to consider one of the graver operative procedures. The head seemed so well engaged in the pelvis that we decided to allow the labor to continue. From six o'clock until eleven in the morning she had extremely hard uterine contractions, so much so that I seriously entertained the possibility of rupture of the uterus. Preparations were then made to deliver her by a Scanzoni forceps operation.

Examination under anesthesia on the operating table showed us no reason to anticipate unusual difficulty. Forceps were applied to the head in the usual manner, but vigorous axis traction failed to bring about descent. She was not in particularly good condition and the prolonged labor and unsuccessful attempt at pelvic delivery had placed her beyond the stage where a cesarean section could be done safely. A pubiotomy was done, the pelvis immediately gaped and traction on the forceps which had been left in position delivered, without difficulty, a living child.

At that time the mother was in fairly good condition and I began to repair what seemed to be a moderate anterior tear. On trying to insert a retention catheter, a procedure which we always do after pubiotomy, I was unable to find the urethral orifice, and then more careful examination made me realize with horror that the entire base of the bladder was torn and open. At the moment it did not seem impossible to repair this tear, but the anesthetist reported complete collapse. Her condition was now so desperate that I thought she would die on the table, hence all operative procedures were suspended, the pelvis packed with sterile gauze and patient returned to her room almost moribund. She recovered from the immediate effects of the delivery but she has a vesicovaginal fistula about the size of a ten cent piece, the exact relations of which I am not yet able to determine.

DR. J. WESLEY BOVEE, WASHINGTON, D. C.—I wish to speak of two points only, one of which is the failure that one must expect when he tries to close the urethra over a tube. It seems the ideal way, but success may not follow in all instances. I have done the operation which has been described by Dr. Ward.

As to the tunneling of the urethra, I did not know that Dr. Kelly had done it, when I did it. In 1917 a woman came into my service with a large vesicovaginal fistula, with no urethra, and with a calculus filling an infected bladder. I removed the calculus and decided that I would try to reproduce the urethra. Dr. Ward tells us that Dr. Kelly did this by drawing a flap from before backward. I did it as Dr. Ward has done it. I tunneled with a scalpel and made a wide flap of the vaginal mucosa, bringing it forward through the tunnel and fastening the anterior end. The edges came together or overlapped in this tunnel aperture. I had the pleasure of demonstrating, three weeks later, that this operation was a success. I then lost trace of the patient but I was not able to get the condition of that woman's bladder satisfactory to me to attempt to close the fistula with an infected bladder. In operating on these cases we find it is best to follow the plan of reestablishing the urethra first, and then closing the fistula. In fact, I believe if we have a destruction of the urethra with no vesicovaginal fistula, our best procedure would be at the time of operation to restore the urethra, that we establish an artificial vesicovaginal fistula for the passage of the urine while the urethra is healing.

DR. JOSEPH BRETtauER, NEW YORK CITY.—Any one who has had to deal with these cases can appreciate the difficulties met with in attempting to close this defect. I have a distinct recollection of one case in particular, in which Dr. Robert Frank and myself made eight different attempts to reconstruct the base of the bladder, where this defect followed a symphysiotomy. All the various plastic methods were tried without success; the only method not employed—the use of the body of the uterus to close the gap—was refused by the patient because of her wish to bear more children. We were not aware of the method employed by Kelly of tunneling the mucous membrane of the vagina.

DR. THOMAS J. WATKINS, CHICAGO, ILL.—As a matter of historical interest, Dr. L. L. McArthur, of Chicago, described an operation similar to the one described by Dr. Ward, which was published in the Transactions of the Chicago Gynecological Society in the early nineties.

DR. WARD (closing).—Dr. Bovee's suggestion of reconstructing the urethra first, and allowing the vesicovaginal fistula to drain is sound advice, as a rule, but in this case it was impossible to construct any urethra until I had constructed something from which I could obtain a flap to work with. The whole base of the bladder was gone, including the site of the internal meatus and urethra, so I had to close the opening into the bladder first. I adopted the ingenious device of Dr. Kelly, as published in Kelly's and Noble's *Operative Gynecology*, and I, of course, appreciated the fact that the flap had mucous membrane on one side only, and that, therefore, one side of the artificial urethra was denuded tissue. I used a very small sized rubber catheter to maintain the patency, because I wanted to make the canal as small as possible. The catheter was retained *in situ* for ten days, in the hope the tissue would granulate around it on the side where there was no mucous membrane.

The suggestion of Dr. Farrar of lining the entire canal with mucous membrane is an advantage, provided one can get a sufficiently wide flap to give tissue enough to complete the circle. If I should get another case I would endeavor to do that, but I hope I will never get another one.

Dr. HARVEY B. MATTHEWS, Brooklyn, N. Y., read a paper entitled
**The Effect of Radium Rays upon the Ovary. An Experimental,
Pathological and Clinical Study.**

The object of this study was to ascertain the effects of radium rays upon ovarian tissue in (a) rabbits and (b) human beings. A series of rabbit ovaries was exposed *in vivo* to different "doses" of radium; removed after varying intervals of time; sectioned and studied with reference to histopathologic changes. No changes were found in doses below 80 mgr., while those ovaries exposed to 1200 or more mgr. showed a round cell infiltration; more or less fibrosis in and about the blood vessels and throughout the stroma, with few imperfect or no graafian and primordial follicles remaining, such changes depending entirely upon the size of the dose administered.

As regards the human ovaries studied, practically the same changes were observed. No human ovary, however, has been studied that was exposed to less than 800 mgr. of radium. From the data at hand, it seems reasonable to state that after a 600 to 800 mgr. dose of radium pregnancy in the human being can and does occur, but doses above these figures cause sterility. It is certain that pregnancy cannot occur following doses of as much as 1200 mgr. or its equivalent. Age is a very important factor as regards the effects of radioactive agents. Young healthy ovaries withstand much larger doses of radium than older, less active ones.

Out of 874 cases of radiated women in the childbearing age, collected from all parts of the United States, 39 pregnancies occurred. From these 39 pregnancies, 20 full term normal babies were delivered. There were 15 abortions or miscarriages and 3 premature labors, thus making the ratio of abortions to normal labors as 1 to 2.6; whereas in Germany the ratio of abortions following x-ray and radium is as 1 to 2.3 in 1512 cases. The estimated ratio of abortions to normal pregnancies in the United States is as 1 to 3 or 4, whereas in Germany it is as 1 to 5 or 6.

In view of the present day confusion and uncertainty as regards nomenclature, a universal standardized method of expressing "radium dosage" is highly desirable.

Finally, the employment of radium radiations in affections of the female reproductive and allied systems should remain in the hands of those gynecologists and obstetricians who have had special training in radium therapy, for the indiscriminate use of such a valuable therapeutic agent can only reflect to our discredit.

DISCUSSION

DR. JOHN O. POLAK, BROOKLYN, NEW YORK.—These experiments were made with the idea of trying to answer the question, does radium treatment prevent or influence future pregnancies? Our clinical deductions were made from applications of 50 milligrams of radium element to the endometrium for varying periods. The control of hemorrhage in an excessively menstruating girl is due to one of two factors, the effect on the endometrium or on the follicular elements of the ovary. If radium is used to destroy the endometrium, naturally that woman will not menstruate, nor, furthermore, if sufficient radium is used to destroy the follicular elements or scar the stroma. We had for a long time been using small doses, from 400 to 800 mgr. for the control of these hemorrhages, and as a result noted a relatively fair number of pregnancies, so that we feel that clinically it was relatively safe.

The other important point brought out refers to the preservation of the primordial cell and its resistance to radium. If the exposure has been long and deep, it may imprison the follicle within scar tissue and thus arrest ovulation or destroy the follicle itself.

DR. WILLIAM S. STONE, NEW YORK CITY.—Reference has been made to two of my patients suffering from Hodgkin's disease, who had been under my supervision for x-ray treatment, who subsequently became pregnant, and were delivered of anencephalic monsters. In order to impress upon you the importance of the subject, it is proper for me to refer to some work that has been completed in our laboratories at the Memorial Hospital, New York. A female rat was radiated for a short time. This rat was mated and the offspring showed deformity, which has been continued through seven generations.

DR. HAROLD C. BAILEY, NEW YORK CITY.—With Dr. Bagg of the Memorial Hospital, I have now in hand a paper on the same topic. We undertook this study in a somewhat different way and a most important part of the paper is a review of the literature, both as regards the results in human beings and in animals. We have come to the opposite conclusion to the one presented by Dr. Matthews. We concluded it was far better to produce complete sterility rather than have the possibility of a damaged germ plasma. The results of experimental studies show that disturbances occur in animals that are exposed to irradiation during the various stages of development. The work of the Hertwigs on amphibians shows retarding of embryonic development following irradiation. In animals Bagg has reported disturbances in development when the animals were treated during pregnancy, and also where the mothers were treated several days before mating. With the x-ray numerous observers have noted defects, specially Little and Bagg. Working on mice they found the characteristic effects spoken of by Dr. Stone, defects or deformities which can be produced regularly in animals already pregnant, or a pronounced eye defect which can be produced and passed through seven generations by treating the mother before she becomes pregnant. On the other hand, Lacassagne and Coutard worked with rabbits, as did Dr. Matthews, and concluded that there was a tendency to abortion and progressive sterility in the rabbits after treatment.

From the standpoint of the human being we have, first of all, a case of Aschenheim of a woman who was irradiated with x-ray for uterine myoma and the conception occurred between treatments. The child was an imbecile with eye defects and a microcephalic head. Stettner also reports an imbecile born after treatment of a myoma during the pregnancy. Dr. Matthews spoke of the 1500 cases of myoma treated by Werner. In this group there were 24 pregnancies occurring later. There were 9 abortions and 14 children were born alive, and of these 4 died during the first year; 3 children at six and eight years of age were 16 per cent under weight, and 8 per cent under normal in height.

There is another article which has just been presented by Archangelsky, who attempted to produce therapeutic abortion in ten women by x-ray treatments. He succeeded in seven after they had passed the menstrual period by a few weeks. The embryos that were obtained showed head defects.

With this literature before us we should treat these cases requiring moderate doses of radium with a great deal of caution, and it is my own belief that if it is necessary to treat a young woman with menorrhagia by irradiation, it is far better to treat her to complete sterility.

DR. HERBERT LITTLE, MONTREAL, CANADA.—I would like to add one clinical experience in connection with this discussion which bears out a great deal that has been said. A young woman, the mother of three healthy children, missed a period in June, and in July had some irregular hemorrhages. She consulted a radiologist, who diagnosed "tumor," and suggested the application of radium. Radium was applied and the bleeding ceased. I saw her in November and thought she was about three or four months' pregnant. She, however, dated the pregnancy from May, and exactly on her fixed date in February she went into labor, and a child weighing 1680

grams, was born spontaneously. The placenta was well developed, showed calcified areas, and weighed exactly 280 grams. The child was well formed, but bore the same relation to a normal child as a stunted Japanese tree to its normal parent. Today that child is over two years of age and weighs but ten pounds; its head is approximately the size of the clenched fist; it cannot see, and it is doubtful whether it can hear; it has three teeth, all molars.

Subsequently, the mother complained of pressure symptoms, and a fibroid tumor was removed which showed no effect from the radium.

DR. F. E. KEENE, PHILADELPHIA.—Last year Dr. Clark and I followed up a series of 500 cases irradiated for benign uterine hemorrhage, and of this number there were five pregnancies, four of them in comparatively young women. One patient who was 47 years of age, became pregnant during the radium amenorrhea. She passed through her pregnancy normally, but died from postpartum hemorrhage. The other four children, as well as the mothers, are perfectly well.

I have had one case of extensive carcinoma of the cervix to which I applied 4,000 mgr. of radium in a young woman who was then between five and six months' pregnant. This patient was delivered in Dr. Hirst's department at the University Hospital at the end of her eighth month. Her delivery was uncomplicated and both the mother and child are well, eight years after the original application. From our experience in these cases, therefore, I should be inclined to agree with Dr. Matthews that a moderate degree of irradiation of the pregnant uterus will, as a rule, have little or no effect on the child. The fact that we apply radium to but very few women in the childbearing age doubtless accounts for the small number of pregnancies above reported.

We feel very strongly that irradiation in young women is inadvisable. I cannot agree with Dr. Matthews regarding standardization of radium dosage. There is, unquestionably, a variation in different individuals as regards resistance to radium rays, and what might be a small dose in one could easily produce unpleasant results in others. Therefore, it has been our plan to underirradiate rather than to overirradiate, and to repeat the radiation as results demanded.

As to Dr. Bailey's statement that he believes complete sterilization should be produced, I take very decided issue. Irradiation in sufficient dosage to produce sterilization would, in many instances, bring on an artificial menopause, which we know is attended with dire results.

DR. WILLIAM P. HEALEY, NEW YORK CITY.—I want to add one personal experience concerning a young woman who had been married two years and no pregnancy had resulted. She came under my supervision because of menorrhagia. She was radiated and given only 400 mgr. A year later she conceived. Within six weeks there were evidences of impending abortion. We kept her in bed for four weeks, and the bleeding having subsided, she went on to term and was delivered spontaneously of a four and a half pound child, which two and a half years later, was apparently in good health.

It seems to me, that when we try to base our conclusions as to the effect of radium by a study of subsequent pregnancies, we cannot altogether blame the radium for apparent ill results, because we are dealing with an abnormal endometrium when we use radium, and we have to remember that the woman might have aborted or might not have conceived at all, no matter how the menorrhagia had been treated.

Again, Dr. Matthews has stated in referring to the treatment of bleeding uteri with radium that the dosage is 800 to 1200 milligram hours. That, in our experience at the Memorial Hospital, is altogether too large a dose. For my own part, I would not think of using more than 400 milligram hours of radium within the uterine canal as a first treatment to control menorrhagia in a young woman in the

childbearing period of life who was anxious to conceive. I think if you go above that, you are asking the woman to take an unfair risk of making her completely sterile.

DR. OSKAR FRANKL, VIENNA, AUSTRIA (by invitation).—I have become very careful in radiating young women in our clinic in Vienna.

Regarding the term 800 or 1200 milligram hours, I would like to emphasize that it is very different whether 50 milligram or 100 milligrams of radium are used. Therefore, it is not the same thing that different men do when speaking of 800 milligram hours.

Underradiation might prove dangerous. Underradiation is a stimulation, and we all have experienced that when at first working with insufficient apparatus, delivering an insufficient amount of rays, we produced the very condition that we wanted to avoid. If we treat a patient with x-ray or radium we must employ a dosage sufficient to destroy the follicular elements.

Concerning the climacteric symptoms, I cannot agree with Dr. Matthews. From the use of radium and x-ray, in our experience, they were identical with those after castration, whenever all the epithelial elements in the ovary were destroyed.

I would like to ask Dr. Matthews whether he paid any attention to the interstitial gland in the ovary. There is a good deal in the literature now regarding the interstitial tissue of the ovary. You know that Steinach and Holzkecht were the first to claim that after slight radiation the ovary showed proliferation of the interstitial tissue. Robert Meyer, on the other hand, says that after x-ray and radium treatment the interstitial gland is obliterated in the same way as the epithelial elements. This is of fundamental importance. We are not prepared to draw any conclusions concerning gland proliferation after x-ray treatment, and I would like to ask Dr. Matthews what his opinion is in this respect. Animal experiments are not conclusive in this respect because they are conducted in a different way. If we treat a woman with radium we use the intracervical application, and I should like to hear from Dr. Matthews whether intracervical application of radium produces obliteration or proliferation of the interstitial tissue.

DR. CHARLES A. L. REED, CINCINNATI, OHIO.—One phase of this question is exceedingly important and extends far beyond the immediate clinical significance of the matter, and that is its relation to a proven biologic law. The scientific world has, for a long time, accepted the idea that the acquired characteristics of one generation become the inborn characteristics of succeeding generations. Weisman, however, has set that theory aside and his doctrine remains unimpeached. Here we find by this treatment of the germ plasma that there developed acquired characteristics, not acquired in the old biologic sense, but evidently there is a direct action imparted to the germ plasma by the radiation. Furthermore, we find that this becomes an hereditary unique character transmissible in a Mendelian sense. If that is true, certainly we have arrived at one of the most significant truths in connection with the whole question of biology. It would be exceedingly important indeed if these investigations are carried on, as I trust they have been carried on, with the view of determining the exact nature of the traumatism upon the germ plasma, and what change in the germ plasma has been noticed, and in what part of the germ plasma it has been registered. To what extent have the chromosomes in the human species been influenced by this radiation?

DR. THOMAS J. WATKINS, CHICAGO, ILL.—Notwithstanding what has appeared in the literature, relative to the treatment of menorrhagia in young women by radium, I see very little indication for such treatment. Menorrhagia in young women is usually due to general disturbances, often of endocrine origin, and not due to the endometrium. It is, therefore, illogical to treat the endometrium when

the cause is elsewhere. Our results with the use of radium for menorrhagia have been that the bleeding has not been controlled unless an amenorrhea has been produced; when the menstruations have become reestablished the bleeding almost invariably has recurred.

DR. GEORGE GRAY WARD, NEW YORK CITY.—We have used radium at the Woman's Hospital in a certain proportion of these cases, appreciating its dangers as Dr. Keene brought out, and always endeavoring to underradiate rather than overradiate. We seemed to get satisfactory results from 100 to 200 mgr., but rarely more than 400 mgr., with the understanding that we might have to repeat that dosage later on.

I want to speak of one case that came under my observation, of membranous dysmenorrhea in a young girl in whom a cast of the uterus, practically perfect, was shed each month. She was curetted for her dysmenorrhea and excessive bleeding without benefit, and I gave her 400 mgr. with good results in stopping the dysmenorrhea and reducing the flow.

As to the point brought out by Professor Fraunkl, it makes a difference whether you use a tube of 50 milligrams or 100 milligrams and where. I use two tubes of 50 milligrams each, place one tube above the other in tandem, thus giving 50 milligrams to the upper part of the uterus, and 50 milligrams to the lower uterine segment in order to cover the entire endometrium.

DR. MATTHEWS (closing).—In reference to Dr. Stone's and Dr. Bailey's remarks, I think these gentlemen fail to grasp my idea. I spoke of the effects after radiation of the follicle and not the effects after irradiation of the impregnated ovum or embryo.

The German and French literature is full of reports of monstrosities due to radiation after impregnation. I mentioned nothing about this phase of the subject. All the work I have done has reference to the changes in the follicular apparatus after irradiation.

The work of Bagg is very interesting, and I am sure it will prove something of very great value. However, the effects of irradiation in the lower animals—mice, guinea pigs, rabbits, etc.—cannot be assumed to be identical with those in the human being, at least at the present stage of our knowledge.

In reference to what Dr. Bailey said, I did not recommend in these younger women doses of 800 to 1200 mgr. for relief of uterine bleeding. I showed characteristic changes in the histopathology of the ovary that has been exposed to these larger doses of radium (800 to 1200 mgr.) We do not use these larger doses. We use 200 to 400 mgr., the same as Dr. Bailey and Dr. Healy do, for the condition under discussion.

DR. CHARLES C. NORRIS AND DR. M. VOGT, Philadelphia, Pa., read a paper on **The Relation of the Endometrium to Ovarian Function**, abstract of which follows:

The theory that the endometrium possesses an endoerinal function is at present based only upon physiologic and clinical proof. The fact that the endometrium differs histologically from other endoerinal glands is no argument against the theory, since all other endoerinal glands differ one from the other, in this respect. The endometrium probably possesses a definite endoerinal function, which like other endoerinal glands, acts in conjunction with certain so-called ductless glands, particularly the ovary, to which it is most likely subservient. The endoerinal function

of the endometrium probably fluctuates with the menstrual cycle, being most active during the premenstrual period. The chief clinical evidence on which this theory is based lies in the established fact that the proportion of women who suffer from nervous phenomena subsequent to hysterectomy, with conservation of one or both ovaries, is much greater than that of those who exhibit painful or palpable changes in the conserved ovary. The most conclusive evidence is found in those patients who have been treated with radium for the arrest of benign hemorrhages. It is difficult to conceive that in almost every case so treated both ovaries are rendered functionless. Furthermore, there is much experimental evidence that tends to show that in these cases the action of radium is limited to the uterus. In operations upon the uterus ovarian conservation is of distinct value, even if panhysterectomy is performed; the ovaries function better, however, and have a longer functional life, if a portion of the endometrium can be preserved. The thickened and permanent premenstrual stage of the endometrium, so frequently present in cases of uterine myomata, is the result of stimulation of the endometrium by the presence of the tumor, and accounts for the prolonged bleeding that is often present.

DISCUSSION

DR. J. WESLEY BOVEE, WASHINGTON, D. C.—The menstruation habit seems to be so strong in some women that after removal of the ovaries and the uterus *in toto*, it continues. I have in two cases failed to permanently stop it, though employing astringents and the cautery to the scar in the vaginal roof, from which the flow escaped. In several cases I have noticed periodical bleeding for several months from the rectum, the nose, the throat, the breast or the axilla. This in each instance followed menopausal cessation of the menses, and exploration and subsequent history and events failed to account for the bleeding. In one patient, of 48 years, the epistaxis was so profuse and prolonged that a rhinologist packed her nose for forty-eight hours.

DR. CAREY CULBERTSON, CHICAGO.—Dr. Norris' remarks relative to the relation between the mucous membrane of the corpus uteri and ovarian function, particularly ovulation, opens up a vast field of speculation. We have been teaching now for some years that menstruation is a phenomenon expressing a retrograde process in its hemorrhagic stage and that its real function appears in the premenstrual stage of vascularization. This edema is apparently carried to its highest development in the formation of decidua, as it appears in pregnancy, and some years ago various investigators, among them Gentili, ascribed the production of a hormone to the decidua vera. If this could be proven for decidua it would be equally true, though in less degree, for the vascularized structure of the premenstruum.

We believe that the young woman is better off for the preservation of menstruation, and we agree with Dr. Norris that the nervous phenomena following hysterectomy with ovarian conservation is proportionately more frequent than is suffering due to changes in the ovaries themselves. We agree, further, that conserved ovaries are of more value, their function better, if the endometrium is likewise preserved. We believe that the highly vascular mucosa, as it appears in the premenstrual stage, represents this tissue at the height of its function, as function is expressed short of pregnancy. The old theory, that menstruation represented one of the processes of elimination, though still retained by a few writers, has been generally discarded. We may have to reconsider this idea, or revamp it in such a way as to make it comprehend a secretion rather than an excretion.

Dr. Norris' reference to the phenomena following ovarian ablation brings up a point in differentiation, that must be made with respect to the climacteric. The climacteric is due to changes which take place in the endocrine system as a whole,

according to the most generally accepted theory, these changes occurring in the hypophysis, the thyroid, chiefly, possibly in the adrenals as well, and as a result the ovarian function gradually dwindles away.

The changes taking place as the result of ovarian ablation in young women represent an entirely different process. Here the ovaries are extirpated and their function cut off at once. The climacteric changes in the other glands have not occurred and the reaction, as expressed by the patient, is accordingly different. We should think of this reaction as castration phenomena rather than as the premature climacteric.

DR. BROOKE M. ANSPACH, Philadelphia, Pa., read a paper entitled **The Trend of Modern Obstetrics. What Is the Danger? How Can It Be Changed?** (For original article see page 566.)

DISCUSSION

DR. GEORGE W. DOBBIN, BALTIMORE, MARYLAND.—I feel that the aggressive methods of urgent obstetrics that have come up in the last few years have been developed more for the benefit of the accoucheur than for the woman herself, and I cannot but feel quite strongly that the promise of relief from the pains of labor is used by the advocates of these procedures to increase the material gains of their practice. Version can be an extremely difficult operation and no obstetrician can do many without realizing that under the best conditions a certain number of children will inevitably be lost.

In 1915 I found that a rapidly increasing obstetric practice suggested forming a partnership with a well-trained obstetrician, and up to the present the alliance has been highly successful.

What Dr. Anspach suggests concerning the difficulty of having a patient satisfied in getting the services of an obstetrician that she did not directly engage is much more fanciful than real when one is dealing with a partnership. We have little or no difficulty in educating our patients to this effect; in fact, many of our patients realize we are working together and ask that both of us be present at the time of delivery.

Whenever possible, the physician to whom the patient has originally applied conducts the delivery, but in the care during pregnancy which frequently covers six or seven months, every effort is made to explain to her the workings of the partnership, so when she actually falls in labor we have rarely experienced any difficulty whatsoever.

I have no hesitancy in stating that our efficiency has very materially increased as the result of the partnership. Two trained men working together can handle any case far better than one working alone, and in the event of complications the advice and moral support of a coworker is most comforting.

Dr. Anspach's results are certainly remarkably good. Before leaving Baltimore I looked up our records and find that his are somewhat better than ours. He presents an actual fetal mortality of 0.76 per cent. Our mortality is larger than that. In the last three years we have delivered 817 women with a total loss of 48 children, about 7 per cent. This, however, includes all macerated babies, and death that can in no way be attributed to the obstetric management of the case. When these are eliminated we have only 10 deaths, a corrected fetal mortality of 1.22 per cent. I must also note that I have been a little more liberal in calculating this obstetric fetal mortality, as I have considered one case where death was due to compression of the umbilical cord, a condition which I think Dr. Anspach eliminated in his statistics.

DR. WILLIAM C. DANFORTH, EVANSTON, ILLINOIS.—In order to indicate what results may be attained by intelligent application of conservative methods I have brought with me a brief resumé of 1029 cases comprising the work of our maternity for the years 1921 and 1922. Of these 447 were primiparae and 582 multiparae. Of these 886 were various cephalic presentations, 665 of them being L.O.A. There were 48 breech, the remainder being various less common presentations. In this series there was a forceps incidence of 19.2 per cent. There were 23 cesarean sections, 41 breech extractions, including 22 versions. Our maternal mortality in this series was 0.39 per cent. In this series the total number of infants delivered was 1046. Of these 49 died at some time prior to the discharge of the mother usually on the twelfth day. The total mortality including all cases up to the time of discharge was 4.6 per cent. Excluding premature babies and including all deaths occurring in labor and subsequent to delivery gives a mortality of 3.5 per cent.

In the first three months' work in this same maternity 144 cases were delivered, 61 primiparae and 83 multiparae. In this series we find a forceps incidence of 25.2 per cent. With one cesarean section and nine breech extractions including two versions, there was no maternal mortality, and fetal deaths from all cases up to date of discharge was 2.7 per cent.

To compare with the 400 private cases which Dr. Anspach has given in his paper, I have data upon a series of my own of 400 consecutive cases. One hundred and sixty were primiparae and 240 multiparae. Of these 265 delivered spontaneously. There were 109 forceps deliveries of which 85 were low forceps, 13 breech extractions, including version and 13 cesarean sections. Excluding premature babies, this series gives a fetal mortality of 1.75 per cent. Including all premature babies for the entire series and all deaths up to the time of the mother's discharge, the total mortality was 3.5 per cent.

Among the fetal deaths of babies at or near term we find that three died of ablatio placentae, one of asphyxia from cord compression, two of anemia, these children having been delivered in cases of placenta previa, and one which died after a difficult high forceps.

When one considers the figures which Dr. Anspach has just given us of the results in a series of cases conservatively managed, and if one in addition considers the figures contained in the report of Dr. Polak of about a year ago and those which I have given in a former report of 500 consecutive cases, it seems to me, that the burden of proof rests upon the shoulders of those who advocate routine operative interference. These reports all show too clearly the value of intelligent conservatism. It is not a debatable question that the application of forceps in many cases is a beneficent thing, and any man of experience knows that the lives of some infants are saved by interference. It seems, however, that the best results are still to be expected from a watchful conservatism supplemented by the proper carrying out of operative interference upon clear indication.

DR. HUGO EHRENFEST, ST. LOUIS, MISSOURI.—No discussion of what modern operative obstetrics does to the child should be limited to the mortality of the fetus. In my monograph, to which Dr. Anspach alluded, I tried to make the point that we must include into our consideration all injuries; also those not fatal. Many of them may be only temporary in their effect, others permanently invalidating the child physically or mentally. I am of the opinion that there are various conditions still being considered as congenital defects which, as a matter of fact, are results of birth injuries.

We should certainly not consider the dangers of obstetric procedures to the child solely from the standpoint of fetal mortality.

DR. HAROLD C. BAILEY, NEW YORK CITY.—Why should these stillbirth figures be revised? Is it proper for us to be excused from delivering premature infants and macerated fetuses? Does not the entire subject of toxemia come in under that heading? I think it is a great mistake to have a presentation of mortality statistics along the line the author has taken. Mortality statistics of premature dead fetuses, stillbirths and neonatal deaths, I believe, should take all such deaths from the seventh month of pregnancy on to thirty days postpartum.

DR. CARL HENRY DAVIS, MILWAUKEE, WISCONSIN.—May I add a word to Dr. Bailey's remarks as to the character of the statistics? They need correction and standardization. We should take in everything from seven months on, count it all in, and then may consider the operative deliveries separately.

I, too, have checked up on a series of 405 deliveries for a paper which Dr. Danforth and I are preparing together. Taking all cases from seven months I had a total fetal mortality of 3.9 per cent. There were only three deaths which could in any way be attributed to the delivery. Two of those were cases of occipitoposterior position in primiparae with flat pelvis, with premature rupture of the membranes, the fetal heart going bad when the cervix was not completely dilated. In each case it was completed manually and the woman delivered finally by version and extraction with dead baby. One woman had the old-fashioned easy labor pains two minutes apart, where I let fifteen minutes go by without listening to the fetal heart, and there was a concealed prolapsed cord, with easy delivery, but dead baby. We should individualize every case. Having internes or nurses hold back the head when we are trying to reach the hospital is bad practice. One should listen to the fetal heart after every contraction during the perineal stage, and deliver quickly when the change indicates danger.

DR. ANSPACH (closing).—If you do not exclude premature birth you cannot show the difference between conservative methods and routine operative methods of delivery of women in labor at term. If you do not exclude the fetal deaths that are entirely independent of the methods employed there can be no accurate comparison.

DR. W. B. HENDRY, Toronto, read, by invitation, a paper on **The Teaching of Obstetrics and Gynecology**. (For original article see page 583.)

DISCUSSION

DR. JOHN O. POLAK, BROOKLYN, NEW YORK.—In order to obviate one of the difficulties that Dr. Hendry has spoken of in regard to correlation, we have in the last two or three years made an arrangement with the Department of Physiology by which we are allowed to start in with obstetrics in the last semester of the second year, when our students are getting both embryology and their fundamentals in the physiology of obstetrics. We believe that in this way we have men coming to the junior year who are better equipped to understand obstetrics, and this freshens their mind, so to speak, in correlation between embryology and obstetrics.

Another innovation we have made in the last few years has been a division of the class into the three trimesters, each extending over a period of ten weeks, when they have cases of obstetrics to deal with. The very introduction of this has been to make gynecology elective, only allowing men who have the highest percentages in obstetrics to elect gynecology, and the proportion of students that have tried the elective course has been encouraging. We find the psychology of making gynecology elective has been one of the best things we have ever introduced. In this way, we have been able to reduce the number of men who are taking gynecology.

I look upon the teaching of obstetrics and its correlation as the most important proposition we have to deal with. Unfortunately, in the past it has been relegated to a secondary position. Surgeons and medical men have been wanting all the time, but one of the things upon which we have insisted is that we shall have equal rights with the surgeon and medical man under the trimester arrangement, and we have an equal number of weeks with an equal amount of time.

DR. RUDOLPH W. HOLMES, Chicago, Illinois, read a paper entitled **The Relationship of Utero-Placental Apoplexy to Ablatio Placenta.** (For original article see page 517.)

DR. FRED L. ADAIR, Minneapolis, Minnesota, read a paper on **Placental Infarcts.** (For original article see page 552.)

DISCUSSION ON THE PAPERS OF DRS. HOLMES AND ADAIR

DR. PRENTISS WILLSON, WASHINGTON, D. C. (by invitation).—In the present state of our knowledge, it seems to me, that any attempt to make an etiologic classification of premature separation of the normally implanted placenta must, for the present, center around the clinical and pathologic nature of the so-called utero-placental apoplexy of Couvelaire.

Two years ago, in reporting a case of my own, which was a typical case of utero-placental apoplexy, as described by Couvelaire, Williams, and others, I collected at that time what I believed to be all the cases in the literature, 69 in number. My conclusion from the study of these cases was that the condition was a toxemic one. In 57 cases of this series in which the pathologic notes were sufficient to attempt drawing conclusions, there was evidence of toxemia in 87.7 per cent, that is, of these 57 cases, 50 showed definite evidences of toxemia. This evidence was obtained either clinically, from the laboratory findings, or at autopsy. In addition to the ordinary evidences of toxemia, there were in some cases such conditions as ecchymosis of the skin, persistent oozing from the abdominal incision in cesarean section, persistent oozing from abrasions of the vulva produced by delivery from below, which tended to indicate that there was some toxic change which had been produced in the blood.

When we come to examine the pathology of the uterine wall in these cases we find a most striking condition, namely, a marked hemorrhage infiltration tearing apart the muscle bundles, and in some cases there were areas, where the condition was particularly bad, disassociating them fiber from fiber. In some places there were isolated strands of muscle tissue extending across the lakes of effused blood.

There were two things in connection with the hemorrhagic infiltration of the uterine wall which impressed me as of possible significance in an attempt to understand the nature of the process which was going on. These two things were, first, the hemorrhage into the uterine wall in very many cases in the series was definitely stated by the observers to have been worse in the subperitoneal layers of the muscularis, rather than in the deeper layers adjacent to the decidua. This was true even over the placental site.

Another thing that attracted my attention in these case reports was the fact that hemorrhage into the uterine wall in many of the cases was noted to have been worse in the neighborhood of the placental site. If the placenta was on the anterior wall the hemorrhage was more extensive on the anterior wall than posterior. In my case, in opening the abdomen I lifted the whole uterus out for inspection. On the left side there was a black effusion directly over the implantation of the placenta.

In addition to the hemorrhage into the uterine wall, there were areas of necrosis, pointed out particularly by Gordon Ley, which occurred independently of the areas of extravasation. Areas in the uterine wall showed marked necrosis of the muscle, yet it would not be associated with a particular hemorrhage. There was also edema of the muscular wall of the uterus, and one very interesting feature was the presence in about 15 per cent of the cases, as I recall it, of fissures in the peritoneum from which blood had escaped in many cases, so that there was in some instances an amount of hemorrhage into the abdominal cavity comparable to that produced by ruptured ectopic pregnancy. In other cases there was the presence of blood stained serum. In one case of Smilie's the abdomen was opened at a fortunate moment to show the mechanism of the production of these fissures. There was a bleb filled with blood which was raised by the effusion under the peritoneum. It is probable that these fissures are produced by the rupture of these blebs of blood. In addition, there was thrombosis in the uterine vessels, mainly in the smaller veins, particularly back of the placental site in the uterine wall, but in some few cases there was extensive thrombosis of the larger vessels, particularly in the case of Young's in which the whole ovarian system on one side was completely thrombosed. The effusion in some cases ran up into the bladder behind the peritoneum; in others it dissected up the posterior parietal peritoneum behind the cecum and behind the sigmoid.

One other point of importance in the pathology was the presence of round cell infiltration around some of the hemorrhagic areas, and leucocytes containing pigment, showing that the process had been a gradual one, and in some cases there had been efforts made at repair. Now, it seems to me, the evidence showed conclusively that this was a toxic process. A point that attracted my attention especially was the pathologic evidence that the placenta or ovum is the source of the toxin. I see no other reason why the pathology should be definitely grouped around the location of the placental site. Although you may not agree with me, my own conclusion is, as a result of the study of cases of premature separation of the placenta, that while I do not deny the possibility and probability in some cases of traumatism being the etiologic factor, I believe we are dealing with a definite clinical entity of a toxic nature, of which these typical cases of uteroplacental apoplexy are the severe type. There are also many milder cases in which, because we do not have to operate and because the patient does not come to autopsy, we cannot prove them to be cases of uteroplacental apoplexy. I am also of the opinion, that the clearing up of the exact nature of this toxemia in these cases will probably shed a great deal of light on the general subject of the toxemias of pregnancy. What the nature of the changes in the placenta is, I do not know.

DR. HUGO EHRENFEST, ST. LOUIS, MISSOURI.—In relation to the general problem, I can only state that any one who tries to read the literature on infarcts, and this is well expressed in Dr. Adair's paper, will be struck by the existing confusion of ideas, theories and explanations, both regarding the actual histology and the origin of these lesions. I personally feel that a good deal of this confusion is due to the indiscriminate use of the word infarct. An infarct is a structural tissue lesion which originates from some circulatory disturbance, either a hyperemia or anemia. In literature dealing with placental infarcts the word at times is applied in this proper sense, often improperly in the description of a fresh or organized blood clot. We read about red infarcts. They might be true infarcts. A red area is seen in cross section of a fresh specimen, often called hepatization of the placenta. The red area represents a mass of extremely hyperemic chorionic villi and then actually is an infarct. We see the same word red infarct, however, applied incorrectly to a similar red mass which on histologic study is found to be an accumulation of blood within the intervillous spaces. A blood clot is not an infarct.

As to true infarcts, macroscopically they represent a whitish mass which histologically is seen to be a mass of compressed, anemic chorionic villi, very often found at the edge of such a hematoma within the intervillous spaces. This hematoma, due to typical changes in clotted blood, might gradually be transformed into a mass of fibrin. The resulting white mass would be improperly called a white infarct. If we would clearly differentiate between the two circulatory systems united in the placental area we could more readily differentiate between the two types of red or white areas seen in the placenta. We must realize that in both types, whether true infarct or hematoma, the red variety might lead, by compression of villi or fibrinization, to the changes into the white variety.

As far as the causes of these placental structural changes are concerned, some find them in the mother, and others in the fetus; both might be right. The senile changes in placental villi, so splendidly shown in Dr. Fraser's pictures, and again similar changes demonstrated in the vessels of the uterine wall toward the end of pregnancy suggest clearly the possibilities of circulatory disturbances in either system, within the villi or in the intervillous spaces. Thus result various pathologic conditions, often secondarily changed, histologically very different, which conveniently but incorrectly are spoken of as red or white infarcts.

DR. OTTO H. SCHWARTZ, ST. LOUIS, MISSOURI.—I shall limit my discussion to the changes in the maternal vessels which may be a factor in the production of so-called white infarcts, and also of the condition of uteroplacental apoplexy. Goodell, in his work on the involution of the circulatory system of the uterus, has described various changes that are characteristic for the puerperium. He states, in describing a case forty-four hours after delivery, that changes were present that must have taken days to occur, and he therefore states as a hypothesis that these changes must occur in a great number of cases in some degree before labor has taken place. From this suggestion I studied a series of 24 uteri, in which 12 were between 36 and 40 weeks pregnant. They were obtained at autopsy and by hysterectomy following cesarean section. We were able to find changes analogous to the changes described by Goodell in postpartum uteri in 11 of the latter cases. In some of them the changes were marked, particularly in one case of toxemia. Furthermore, it is to be remembered that early in pregnancy there is a great swelling of many of the vessels and particularly changes in the intima. The thickening of the intima also occurs in other parts of the body whenever the circulation is interfered with, particularly in the fetal circulation in the vessels leading to the umbilicus after the cord is ligated. These intimal changes are also found in cases of hypertension. Therefore one might expect such changes to be more characteristic in cases of toxemia.

We feel these changes are of particular significance in the condition of uteroplacental apoplexy, the extent of the lesion depending upon the site and size of the vessel involved. If a small vessel ruptures in the spongy decidua we may have a small retroplacental hemorrhage; if a larger vessel should rupture, we may have a more extensive hemorrhage and perhaps definite separation.

As regards the classification of so-called infarcts, we believe there are three types—the hematoma, the red and the white infarcts. The red infarct is an early stage of the white. There is a definite transition from one to the other. The hematoma in its various stages is, obviously, of itself not an infarct.

DR. CAREY CULBERTSON, CHICAGO, ILLINOIS.—After listening to Dr. Willson's and Dr. Ehrenfest's excellent pathologic description of these infarcts, I wish only to say that I have had the opportunity of studying Dr. Holmes' sections and they match up well indeed with the description of uteroplacental apoplexy of the Convelaire type as described by Dr. Willson. The sections of the uterine wall show,

first of all, a considerable degree of hyalin degeneration of the muscle fibers and cells, and, in some cases, of the connective tissue. The thrombosis of the vessels, the round cell infiltration, as well as the presence of numerous polymorphonuclear leucocytes indicate more than an ordinary degree of abnormality. There appears to be the normal amount of syncytial elements in the uterine wall, the changes usually seen in connection with pregnant uterus. The changes in the placental portion of the section of the chorionic villi show the amount of necrobiosis usually found in the presence of hemorrhage. These hemorrhagic areas are numerous and often extensive.

DR. HOLMES (closing on his part).—While I dwelt largely on the pathologic specimens, the full purport of my paper was a clinical study.

It is rather startling to be told by an assistant in Vienna, in 1901, that he never had seen a case of premature detachment in his seven years' residence in the hospital, while the Dublin Rotunda has a frequent incidence, or why one New York maternity will have an incidence of 1 in 94, and the other 1 in 395. We believe the explanation lies in the interpretation of the picture. There must be a drastic revision of the picture drawn by textbook writers if we are to hope for a more general recognition of cases of premature detachment. Most textbooks describe the symptomatology so faultily that we wonder any one, let alone the writer himself, could identify a case from the incorrect description. The diagnosis must be rewritten.

It has been reiterated that we may have only a traumatic and toxemia etiology for ablatio. I would strongly deny this, and would again state that I believe degenerative changes, or inflammatory processes, of placenta and its connections may be direct causes. One able pathologist maintained my sections merely demonstrated normal uterus and placenta. All others who have seen the sections agree that they exhibit extremely unusual pathologic entities. To me it seems absurd to agree that all other tissues of the body may undergo inflammatory processes, and the placenta may not. How may the fact of villi being literally bathed with polymorphonuclear leucocytes be explained except by inflammatory action of bacteria?

It is a remarkable fact that Goodell and I could find reports of only four eclampsies associated with ablatio, if toxemia is such a vital element. One thing is paramount, and that is, to hold that eclampsia and toxemic apoplexy are produced by different poisons which have definite selective actions on different organs. While my patient conformed to the type required—an albuminuria—she did not look toxemic, but was anemic, and suffering from the stress of severe pain.

DR. ADAIR (closing).—I admit, as Dr. Ehrenfest states, that the word infarct is not a very good term for this condition, but no one has proposed a substitute that has been acceptable.

The relationship between uteroplacental apoplexy, and some of the hemorrhagic conditions which we see in the placenta is, I do believe not so difficult to determine as one might think. In the examination of many different placentae, one finds definite hematomata on the maternal surface of the placenta. I have both gross and microscopic sections of hemorrhages on the maternal surface of the placenta, and some of these hemorrhages have made excavations into the maternal side of the placenta. The fact that some of these hemorrhages are localized, does not mean they always remain localized. It is not difficult to understand how there may be one small localized area of hemorrhage on the maternal surface of the placenta. Furthermore, it is not difficult to understand how this localized hemorrhage on the maternal surface of the placenta may later become organized and produce a white infarct on the maternal side of the placenta. These hemorrhages

on the maternal surface of the placenta and in the interstitial portion of the placenta particularly, seem to be of maternal origin, and the blood seems to be maternal blood.

To be more specifically talking of my own paper, I do believe the white infarcts so-called are not a distinct pathologic entity. I believe they are the result of a number of different processes. I recognize with Dr. Schwarz and Dr. McNally that there are stages in the development of these so-called red infarcts, which I think ultimately may lead to the formation of so-called white infarcts, but I do not believe that all of the white infarcts result from so-called red infarcts. I do not believe that all of the white infarcts have had this antecedent stage of red infarction. In some of the specimens which I showed yesterday you could see definite degenerative changes of the villi which had nothing to do with red infarcts. In these areas there were masses of degenerated villi sharply circumscribed from the surrounding normal tissue.

I may say that more or less intermittently since 1915 I have been interested in this subject, and my conclusions are in no way final, but I believe very definitely that some of the statements I have made are correct. The white infarct is, I believe, the terminal stage of different degenerative processes in the placenta which have different etiologic causes.

The relationship of infection to some of these degenerative processes must be considered. In addition to infection the woman in pregnancy may present such toxic conditions as may result from nephritis, from preeclamptic toxemia, a group of conditions which may be grouped under toxemias.

One other point I should like to make in connection with Dr. Holmes' paper is that we can account for the apparent paucity of cases of eclampsia in association with ablatio placentae. Many of these cases are definitely emergency cases, and many of them have not had careful observation during pregnancy. I imagine if these cases were more carefully observed during pregnancy, more of them would be found to have preeclamptic toxemia. I have recently come in contact with three cases of this sort, and two out of the three had had definite observations made during pregnancy, and two, while never presenting the convulsive stage, were definitely in the preeclamptic group. The third case had no antenatal observation, and I do not know whether she was eclamptic or not.

DR. N. SPROAT HEANEY, Chicago, Illinois, presented a paper on **A New Method of Estimating the Patency of the Fallopian Tubes.** (For original article see page 581.)

DISCUSSION

DR. GEORGE GELLHORN, ST. LOUIS, MISSOURI.—I tried this procedure in two cases. The patient was put in the Trendelenburg position, the vagina filled with antiseptic solution after the pipette had been introduced, and things seemed to go very well until the end of the compression, when bubbles returned in both instances. In one of these cases I had to open the abdomen later and found the tubes patent. Unfortunately I forgot at the moment Dr. Curtis' method of inflating the tubes with air from the abdominal ostium, so that I cannot say whether constriction, atresia, or closure of the tube had occurred near the uterine end.

Now, I am very far from drawing any conclusions from so small a number of cases in view of the results reported by Dr. Heaney. I am quite sure that the introduction of air is harmless. The only doubt I have is that pressure by means of an ordinary bulb is not sufficient to drive air through the narrow uterine end of the tube, if that ostium happens to be closed by folds of mucous membrane.

It seems to me, this would be a sufficient obstacle to the small amount of pressure that Dr. Heaney can employ; otherwise the simplification would be a very welcome addition to our procedures.

DR. BROOKE M. ANSPACH, PHILADELPHIA, PA.—In the gynecologic clinic at the Jefferson Hospital we have a syringe of that type ready in all cases in which we contemplate abdominal section after crurectomy or a plastic operation. We have used it in many cases and apparently it is a reliable method of testing the patency of the tubes. For the routine application of the Rubin test, however, we have preferred to use a carbon dioxide tank with a manometer gauge. This, I believe, gives us more reliable and standardized information. We use it in all cases in which the tubes may be closed, in which we suspect adhesions, just as a matter of observation to see how uniformly operation bears out the conclusion drawn from the test.

I have been especially pleased with the method advocated first, I believe, by Dr. Curtis, of retrograde insufflation of the tube in cases in which you do a conservative operation, salpingostomy, with the hope of restoring the patency of the fallopian tube and securing subsequent pregnancy. Certainly, we find many cases in which we can open the outer ostium of the tube, yet we do not know without this test whether the inner ostium will functionate and make possible the result we hope for.

DR. HUGO EHRENFEST, ST. LOUIS, MISSOURI.—With considerable personal experience with the Rubin method of testing the patency of the tubes, I may say that there is a definite place for both methods. The Heaney method is by all means the proper way of testing the patency of the tubes in the operating room, but the Rubin method is the only convenient procedure of studying cases that come to the office on account of sterility.

The obvious advantages of the Rubin method over Heaney's as an office test are briefly the following: Escape of air when we begin to inject is usually unavoidable. If in this way syringe or bulb are emptied too much, the cannula must be withdrawn, the bulb refilled and the cannula reintroduced. This is actually dangerous with a liquid in the vagina. In the Rubin method I let the gas flow at a certain definite pressure and introduce the tube gradually into the cervix, with air escaping. As soon as the bubbling ceases I know that I have a tight fit. From that moment the manometer rises and is carefully watched. The manometer will gradually rise to 80 or 100, or more. We see it go down, and when neither hissing or bubbling is heard, we know the tube is patent. We stop the gas and thus never get enough into the abdomen to cause discomfort. We permit a gradual rise up to 180 and 190, and know that, at least this time, neither tube was patent for this pressure. We can repeat the same experiment at another time which I would advise in every case. If we find gas to pass only at a relatively higher pressure, above 120, we might assume some stricture. There is an advantage in the office test of having plenty of gas behind the tube in the form of a tank to regulate its flow and observe carefully the pressure at which it passes through the tubes. It seems plausible that with such accurately measured pressure partially or slightly closed fimbriated ends might be opened. As a matter of fact, we observe occasionally heretofore sterile women to become pregnant after this test. I have two such cases now under observation and records appear with increasing frequency in the literature where pregnancy has followed the test of Rubin. Whether this is mere coincidence or the test had something to do with the result, I do not know.

DR. CARL H. DAVIS, MILWAUKEE, WISCONSIN.—To simplify the method, the apparatus which I exhibit has a distinct advantage over both that of Dr. Furniss

and that of Dr. Heaney. The one with a Y-tube I used shortly after Dr. Furniss' article appeared in *Surgery, Gynecology and Obstetrics*, and I have used it for all tubal tests where pneumoperitoneum was not desired. A 100 c.c. Luer syringe gives a minimum amount of air that one should have. It has been shown in Peterson's Clinic that some uteri and closed tubes have a capacity of as much as 50 c.c., and therefore, if you are depending on the ordinary ear syringe you will think the tubes have been permitting air to pass through when it is not the case. I think you will find the smaller apparatus with large ear syringe connected with the Rubin cervical tube has a distinct advantage over the ear syringe or glass connection shown by Dr. Heaney, due to the fact that it cannot break, and it can be fitted tightly in the cervix. It also fits better into the ostium of the tube than the Luer syringe described recently by Dr. Curtis, and is an improvement over both of these devices.

I have two patients at the present time who are pregnant following the opening of the tubes with pressures of 200 millimeters.

In this work we should constantly emphasize the possible dangers of tubal inflation, and lay stress on the contraindications so as to keep it from being abused and a valuable method condemned due to abuse.

DR. GEORGE GRAY WARD, NEW YORK CITY.—We have had considerable experience with Dr. Rubin's method at the Woman's Hospital, and we have now records of about 600 cases that were insufflated without any untoward results.

I wish to emphasize the remarks made by Dr. Ehrenfest as to the value of the more scientific Rubin technic. Simpler methods may have their place in certain conditions. It is very necessary to have a continuous flow of the gas at a definite rate of flow. Rubin states that the mercury should rise 100 millimeters in 20 seconds, and that the rate is to be established with the apparatus before insufflation is commenced. It is essential to watch the mercury manometer very carefully in order that you do not cause damage by excess pressure. With the method of using a syringe or compression bulb, you have no way of accurately gauging how much pressure you are exerting. Reuben Peterson has stated, I think, that a tube has been shown to blow out by using more than 200 mm. of pressure. In other words, it has been established that 200 mm. of mercury is the limit of safety. Furthermore, with many of these cases we are able to diagnose whether there is partial obstruction or complete obstruction of the tubes. I do not see how this can be done with the ear syringe method, as it is necessary to watch the mercury manometer in order to know the pressure at which the gas passes through; for instance, if the gas passes at 150 mm. instead of 80 mm. it would indicate a partial obstruction. We have had in our series of cases three that apparently got pregnant, due to the insufflation. These were cases that had been sterile for a long time and following insufflation promptly got pregnant.

DR. GEORGE W. DOBBIN, BALTIMORE, MARYLAND.—I would like to ask Dr. Heaney if he has made any observations as to how much pressure can be obtained with an ear syringe. When I first obtained the Rubin apparatus I was much impressed by the extreme difficulty in raising the column of mercury by simply blowing into the tube. It was with great difficulty that I could raise the column 40 to 50 mm. and to have pushed it to a height of 80 or 100 mm. would have been absolutely impossible.

DR. JOSEPH L. BAER, CHICAGO, ILLINOIS.—I wish to mention briefly two cases. One who had been sterile for three years, came under my observation about a year and a half ago. I used the Rubin apparatus with a considerable pressure, somewhere between 170 and 180, and with this pressure tubes were found to be

patent. Four months afterward I had to operate on her for a ruptured extrauterine pregnancy.

The second case was a young married woman with sterility of two years' standing. She came in and I again wanted to use the Rubin test, but deferred it until after her next menstruation, this being my routine in all manipulations in the presence of pregnancy. She did not menstruate. She was pregnant, and I commend that one small point in the use of the Rubin of any other intrauterine manipulation for sterility—to wait for the end of the next menstruation to carry out this test.

DR. LEWIS S. McMURTRY, LOUISVILLE, KENTUCKY.—I would ask Dr. Heaney in closing the discussion to state his estimate of the value of this maneuver as a diagnostic and therapeutic resource. The etiology of sterility is both complicated and obscure, and to properly evaluate this procedure as a therapeutic measure, we should determine its results in a considerable number of cases carefully selected for this purpose.

It is well known that pregnancy sometimes occurs in cases where the tubes have been extensively diseased, wherein gross lesions have been found: in cases wherein one tube has been removed and the other preserved, and under apparently hopeless pathologic conditions. Nature is wonderfully resourceful in the process of reproduction.

DR. ARTHUR H. CURTIS, CHICAGO, ILLINOIS.—There has been such a complete and free discussion of this subject that I think it is advisable to report unsatisfactory as well as satisfactory results. I know of three deaths, one of which occurred in a small town not very far from Chicago. It is impossible for me to give you the details of that case except I learned that the practitioner was a young man who had had a very good internship and was supposed to be cautious and careful in his work. Upon inflation with the Rubin apparatus the patient died immediately on the table. I understand that no undue amount of pressure was used.

Concerning the second case I know the details of the work. Inflation was done without undue pressure, and this patient died suddenly a few days following the inflation.

The third patient unfortunately was on our service; I performed the insufflation. We found the tubes were obstructed. We operated for a chronic pelvic infection in which, apparently, there were no residual bacteria remaining in the tissues. Cultivation of the tissues showed no organisms. There was some cellulitis. I anticipate that there may have been an active infection despite negative cultures. This patient died of purulent peritonitis three or four days later. We fear that the pressure exerted by the use of the Rubin apparatus was responsible; the operation was performed without difficulty or unusual incident.

DR. HEANEY (closing).—To condemn this method because it is too simple and in consequence will be used by those of little experience is not, in my mind, a condemnation but a hearty recommendation.

The bulb of the syringe is comparative to the bulb of a blood pressure apparatus. You all know that you can get very high pressure in the blood pressure apparatus by one bulb's pressure after the arm band has been pumped up. The same must be true in the use of the ear syringe for this purpose.

I have been using this method of testing the tubes per laparotomy since 1900, and when you are dealing with a perfectly normal tube, there is no pressure. We have been using this method of testing per vaginam for over a year, both in cases of sterility and in every case, no contraindications being present, where we have operated on the patient vaginally and subsequently entered the abdomen. In

cases that were perfectly normal, that is to say, women who had children, where there was no history of inflammatory disease, the air passed readily through the tube without any pressure. In other words, I want to emphasize that the simple passage of the air through the tubes is not an index that they are normal, but the air must pass with ease. If pressure is required, it means that the tube is constricted either by adhesions or is congenitally small.

I believe that high pressures are dangerous and that if the air does not readily pass through the tubes, no attempt should be made by the use of high pressure. I recently had a tube burst during the laparotomy when very little pressure was used, certainly not over 100 mm. Hg.

In closing, I wish to emphasize that we must not lose sight of the fact that the simple passage of air through the tubes does not say that the woman can become pregnant. There are many other angles to the sterility question which this method, the Rubin method, or any other tubal method, does not solve.

DR. CARL HENRY DAVIS, Milwaukee, Wisconsin, presented a paper on **Weight in Pregnancy; Its Value as a Routine Test.** (For original article see page 575.)

DISCUSSION

DR. RALPH H. POMEROY, BROOKLYN, NEW YORK.—Quite obviously Dr. Davis does not consider it a *magnus opus*, yet claims a definite feature. We should all acknowledge the practical necessity of observing the weight as one of the items of prenatal care, which perhaps in strictly private practice as a routine in all cases could not be accepted as of universal importance; but in prenatal institutional work I believe it should be accepted without hesitation, particularly on account of its effectiveness in making an impression on the patient. Our great problem in all prenatal care is how to get control of the patient; how to make her do what we wish her to do in regulating her life, particularly during the last three months of pregnancy. These patients become acutely interested in our repeated checking up of blood pressure, while the mysteries of laboratory tests and reports are beyond their comprehension and prompt no deep reaction of concern on their part in our professional orders and instructions. Frequent and systematic weight-recording would vividly impress a prenatal patient and induce her to heed items of dietary regime that she would otherwise persistently ignore.

DR. FRED L. ADAIR, MINNEAPOLIS, MINNESOTA.—This paper emphasizes the importance of the routine antenatal care of patients, and weighing is a part of medical antenatal care. It brings up the question as to what should be included under medical observation and in the medical care of pregnant women.

For the past twelve or more years I have conveniently arranged record sheets in parallel columns, so that they include items of symptomatic importance and of clinical observation of the patients. These can be recorded with appropriate dates. The preliminary examination of the patient, which I make, includes not only the obstetrical examination, but a fairly careful physical examination of the whole body. In addition to this we have certain routine observations which are made periodically and incorporated in our records, including not only the weight, but the patient's temperature, the pulse rate, the hemoglobin, blood pressure, observations, and certain symptomatic observations which are particularly characteristic of toxemias. It is very important to make weight observations during pregnancy, as I believe that they give us not only an indication of the importance of appropriate diet, but definite data regarding the general physical condition and

nutrition of the particular patient. A point which is made regarding the rapid increase of weight in association with toxemias and the relation to accumulation of the fluids in the body is very important, and, associated with this, I have observed a rapid fall in hemoglobin. If you make routine observations of the hemoglobin in these cases, coincident with the rapid increase in weight there is usually a drop in the hemoglobin due probably to the mixture of the blood with certain tissue fluids when the blood drop is secured.

In reference to the importance of diet with relation to toxemias and the control of edema, I am not in full accord with Dr. Davis, not that I minimize its importance, but we must regard edema as only a symptom and only one index of toxemias. In many cases I have had under observation, we have been perfectly able to control the edema and the accumulation of tissue fluids by proper therapy. I am rather sceptical about our ability to control toxemia. There are two quite different factors, and we must recognize that while there is an intimate relationship between edema and toxemias, and while by our therapy we can improve the general condition of the patient and remove the edema, still we are unable to control the toxemia.

DR. DAVIS (closing).—I am inclined to believe that in the production of toxemia we have many factors, such as focal infections and others that work together, which finally result in the edema. However, excessive eating undoubtedly burdens hard-worked organs and may be an important factor in the production of edema and toxemia. I trust you will all use your scales more in the future.

DR. EDWARD A. SCHUMANN, Philadelphia, Pa., presented the report of
A Case of Periumbilical Ecchymosis Associated with Acute Salpingitis.

The patient, F. M., a woman of 27, was admitted to Frankford Hospital December 3, 1922, with a diagnosis of ruptured ectopic pregnancy. The family and previous medical histories were irrelevant. Since adolescence at 13, she had always some irregularity of menstruation with severe dysmenorrhea. She had missed one period prior to present illness. Eight hours prior to admission the patient became acutely ill with generalized pain, marked prostration and one attack of vomiting. The attack was associated with a profuse leucorrhea. The general physical examination was negative except for the abdomen which was rigid and tender, with some distention. There was a marked area of subcutaneous ecchymosis surrounding the umbilicus. This area was deep bluish black, the color fairly evenly distributed, more below than above the umbilicus and closely corresponded to the conditions described by Cullen.

On vaginal examination the uterus was found to be the size of a large orange, soft, regularly enlarged. There was a very marked tenderness on palpation of the cervix which was soft and not fixed. The adnexa were extremely tender, the right more than the left. The temperature was 98°; pulse 96; respiration 26; hemoglobin 85 per cent. Red blood cells 4,620,000; white cells 8,800; polymorphonuclears 93 per cent; small lymphocytes 5 per cent; large lymphocytes 2 per cent; urine negative; blood pressure 120-70. A diagnosis of ectopic pregnancy was made, based upon the history, the physical findings, and especially upon the periumbilical ecchymosis.

Immediate laparotomy was performed under ether anesthesia with the following findings: both tubes were found to be intensely congested, swollen, and dripping fluid, yellowish pus from their fimbriated extremities. The appendix was the pelvis, adherent to right broad ligament, but not acutely inflamed. The uterus was

normally pregnant at two months. There was no blood in the abdominal cavity at all.

Both tubes and the appendix were excised and a cigarette drain carried to the culdesac. The postoperative course was uneventful, the highest temperature being 99.2° and the pulse 98. Patient was discharged on the fourteenth day, still pregnant and feeling well. The excised tubes showed on section, extremely acute salpingitis, the infecting organisms being the streptococcus and staphylococcus.

A critical review of the above case leads to the emphasis of three points: (1) Periumbilical ecchymosis can occur without the existence of ectopic gestation and in the absence of any free blood within the peritoneal cavity. (2) The association of an extremely acute and fulminating salpingitis, so acute that upon operation, eight hours after the onset there were no adhesions whatever observed about the tubes, in the presence of a normal intrauterine pregnancy, is most unusual, and points to an infection via the blood and lymph channels. (3) The smooth postoperative course after salpingectomy for acute salpingitis suggests the possibility that the universally practiced conservatism regarding operative procedures in the acute stages of this lesion may be exaggerated.

DISCUSSION

DR. JOSEPH L. BAER, CHICAGO, ILLINOIS.—The striking feature to me was the combination of two exceedingly rare disease entities in one case, the salpingitis in the presence of pregnancy being itself sufficiently noteworthy, and then added to this the umbilical ecchymosis.

I went over the literature to see how far back I would have to go to find the first case of the former condition, and I found in the transactions of this Society in 1891, a series of cases reported by C. P. Noble, in which he spoke of one particular case that had a combination of pregnancy with an acute salpingitis.

With regard to the other half of the combination, the umbilical ecchymosis, there is an article in the *Wiener Klinische Wochenschrift*, 1919, xv, by Hostetter in which he reports ruptured tubal pregnancy with umbilical ecchymoses, complicated by umbilical hernia, but lays no emphasis on it as a diagnostic sign of extrauterine pregnancy. It occurred when free blood was present in the abdomen. Dr. Cullen makes no pathognomonic claim for umbilical ecchymosis as evidence of extrauterine pregnancy. A ruptured vein of a fibroid, a bleeding corpus luteum, a perforated gastric ulcer, or any other source of free blood in the abdomen can conceivably do the same thing. In fact, the usual ecchymotic discoloration, as described by those who have commented on it, might be conceivable if there was an intraintestinal hemorrhage with a very considerable quantity of blood lost from a duodenal ulcer. The dark blood in the lumen of the intestine, seen through a thin abdomen and a very thin umbilicus, with transillumination, would show discoloration of the umbilicus, but not of the ecchymotic type.

The etiology for salpingitis in the presence of pregnancy is of real interest. Whether the infecting organism finds its way in at the time the spermatozoa are present in the tubes and manages to get into the tubes prior to the shutting off of the uterine cavity, or whether it appears later in pregnancy and is lymphatic or hematogenous in its attack on the tubes, is debatable. In my opinion the route for bilateral salpingitis in pregnancy is *via* the lymphatics. The lymphatic connection between the appendicular focus or sigmoid focus is more likely to be the method of approach to both tubes than the hematogenous. The hematogenous would show characteristically the embolic infarcts in the tubular wall, while in the ascending cases the picture is that of a purulent endosalpingitis, and not the embolic picture which one would get in hematogenous infections.

DR. FRED L. ADAIR, MINNEAPOLIS, MINNESOTA.—I did not understand from Dr. Schnmann's report of his case whether or not there were any other ecchymotic spots on the body. In the presence of a streptococcic infection that would be quite important.

DR. HENRY T. BYFORD, CHICAGO, ILLINOIS.—Formerly we operated upon many neglected cases of small and medium sized ovarian tumors complicated by pelvic infection and firm adhesions, and thus connected with extensive and intense pelvic congestion. In such we usually found not only congestion but hypertrophy of the superficial as well as the deep blood vessels at and below the umbilicus.

I believe that the ecchymosis about the umbilicus would not be due to the presence of blood in the abdominal cavity, but to the extent and intensity of the congestion that had produced the hemorrhage. Extrauterine pregnancy on a rapidly growing adherent ovarian cystoma would increase and spread the congestion above the pelvic brim beyond that of ordinary salpingitis. In such cases a slight trauma or an accumulation of hardened feces in the colon might have been forgotten, or hardly noticed, and yet might produce the ecchymosis.

DR. JOSEPH BRETTAUER, NEW YORK CITY.—So far as the ecchymotic appearance of the umbilical region as an early sign of recently ruptured ectopic pregnancy is concerned, I must confess that in our experience it has been more conspicuous by its absence than by its presence. Ever since Dr. Cullen called our attention to this symptom, we have been especially careful to make this observation, but to my recollection it was present only once, and even in that instance, opinion was divided among the members of the staff.

As to the extremely rare complication of disease in Dr. Schnmann's case, I would be willing to accept his explanation only in the event of negative cultural findings on the cervix, and of negative blood cultures taken before and after operation. A history carefully taken, very often shows some interference with early pregnancy.

DR. SCHUMANN (closing).—In answer to Dr. Adair's question, there were no other ecchymotic spots on the body, nor did the periumbilical discoloration present the appearance of the purpuric spots of streptococcic infection. Furthermore, this patient did not herself present any evidences of a generalized infection.

In answer to Dr. Brettaner, the history was taken as well as possible. There were blood cultures made subsequent to operation which were negative. Smears were made from the cervix subsequent to operation which disclosed no unusual bacteriology whatsoever. In regard to preexisting salpingitis, I mentioned in this case that the tubes were acutely inflamed. There were no adhesions and they were perfectly free and relaxed.

DR. ARTHUR H. CURTIS, Chicago, Illinois, read a paper on **Chronic Leucorrhea**, a short abstract of which follows:

There is now general acceptance of Curtis' view that chronic infection of the body of the uterus is unusual; employment of the curette in attempts to relieve suspected endometritis is considered a misdirected and harmful procedure. In contrast, the cervix is believed to be an important focus of infection and a chief source of chronic leucorrheal discharges. Available measures in the control of chronic leucorrhea consist in eradication of gland infection in the vicinity of the urethra, dilation of cervical strictures, and destruction of hyperplastic or infected glandular tissues of the cervix. Cure of the diseased cervix may be achieved through radium

application, which produces atrophy of the infected glands, or through surgical removal of the endocervix. Destruction of infected Skene's ducts and urethral glands, together with thorough dilation and radium treatment of the cervix has been followed by recovery from chronic leucorrhea in 87 per cent of 104 patients treated.

DISCUSSION

DR. J. WESLEY BOVEE, WASHINGTON, D. C.—Dr. Curtis has given us a very clear picture of what we find in chronic leucorrheal cases, particularly the bacteriologic findings. Very rarely indeed do we find the gonococcus in chronic cases which have a clear clinical history, and perhaps frequently the patient states that gonorrhea was the impelling cause.

I have carried out in these cases a treatment which varies somewhat from the plan of Dr. Curtis,—the use of the galvanocautery instead of the radium, in 61 cases. Forty-eight of these were private patients. Most of them I treated at my office, and a few in the hospital. I cannot give the exact data as to the relative number, but certainly many of them give evidence of cures.

In one case in which I carried out this procedure, using a one-inch cautery, I did it merely to test the effect of it as shown microscopically. I removed the cervix with the rest of the uterus and the appendages which were involved, and the pathologist promptly reported that I had destroyed all the infected area in the cervical canal, with the exception of a small part at the internal os. In another case, only three weeks ago, after discharge following galvanocauterization, I split the cervix in this single woman up to the vaginal junction and then found that the portion I split was three-quarters of an inch in length and over half an inch above that, showed a condition of chronic infection, which I cauterized, and sutured the cervix incisions. In cauterizing the urethra and Skene's glands, in most cases I have done it under a general anesthetic, but in a few by the application merely locally of a four per cent cocaine solution applied on cotton through the external meatus, and one can do this without injury or pain to the patient. I do not know what the effects of this will be on reproduction. Four of these cases were done on women who apparently had otherwise normal reproductive organs, were married and living with their husbands and in the childbearing era. Three of these women had never been pregnant before. One had been pregnant once fifteen years ago, and one twelve years ago.

DR. THOMAS J. WATKINS, CHICAGO, ILLINOIS.—There is probably no infection in the body so much neglected as that of the cervix. Discharge from Skene's ducts generally means infection; one duct being larger than the other also generally means infection. Reinfections are common and should be invariably guarded against. Although some cases of erosion may be cured by topical applications in the office, cases that do not readily respond to such treatment, should be treated radically, either by surgery or radium, or both. After excision of extensive erosions of the cervix, it is my custom to use a small amount of radium so as to be certain of a cure.

The almost universal habit of prescribing douches should be condemned. The douche usually does harm, and seldom good.

DR. HERMAN J. BOLDT, NEW YORK CITY.—For a number of years it has been my custom to treat patients with chronic endocervicitis with the cautery, and I can frankly say that I have yet to see the first patient who has not been cured in that way, so that I have not resorted to any other method of treatment. The cautery should always be used at a white heat and only thrust the point into the cervical canal (its entire length) and out again. It may be necessary to repeat the treatment two or three times, but I do not at this moment recall that a patient

required it more than three times. The repetition of the treatment may be undertaken after six weeks or two months, but on the first evidence of a slight recurrence I would repeat the treatment.

With regard to the office and hospital treatment of these patients, occasionally we may find a patient who is in such a hardened condition, if I may use that term, that she can bear treatment in the office, preceded by cervical dilatation, and I prefer invariably to dilate the cervical canal first. But the majority I prefer to treat in a hospital. As a rule, there is no occasion for an anesthetic unless the patient is unable to withstand cervical dilatation previously. I have a cautery point which is made similar to that of Dr. Bovee's, an inch and a half long, with just the same thickness at one end as at the other. It is unnecessary to use a tapering point. The ordinary galvanocautery point is not desirable.

DR. RALPH H. POMEROY, BROOKLYN, NEW YORK.—We have been discussing with great elaboration the matter of treatment of leucorrhea, but you have apparently overlooked the importance of certain original work of Dr. Curtis on the bacteriology of chronic infection of the cervix and its relation to our combined responsibility as obstetricians and gynecologists, in trying to understand the type of story that Dr. Schumann presented to us of an acute, purulent streptococic salpingitis combined with pregnancy. Have we not a huge field for consideration as to problems we continually meet with, of the surgically unexplained puerperal sepsis and the infected abortion in which we cannot detect or prove any point of surgical contamination? How many of us have ever been able to explain satisfactorily the increased incidence of puerperal sepsis, of salpingitis, and of septic abortion in connection with "flu" epidemics, in which the presumption may well be that the streptococcus has some relation to an infected blood stream, not only through the throat, but through associated and activated infection of the cervix uteri?

DR. CURTIS (closing).—I have been interested in the development of so-called idiopathic postpartum infections in patients who have not been subjected to surgical interference or to digital examination at the time of labor. Almost invariably it appears that there has been either a very rapid labor or disproportion between the fetus and soft parts. There is usually a tear in the cervix which extends into the broad ligament in such a way that there is opportunity for invasion of streptococci into the deeper cellular tissues.

We do not claim that radium is a cure-all or is an ideal means of caring for chronic leucorrhea of cervical origin. What we do wish to draw your attention to is that we now usually recognize the sources of these discharges, and are, therefore, in a position to relieve chronic leucorrhea. If possible, we ought also to know the bacteria which are present. These foci may be eradicated in two or three different ways; radium, excision of the endocervix, and cautery destruction of the diseased tissues are all efficacious.

(To be continued in the December issue.)

Department of Reviews and Abstracts

CONDUCTED BY HUGO EHRENFEST, M.D., ASSOCIATE EDITOR

Collective Review

SOME ASPECTS OF THE METABOLIC DISTURBANCES OCCURRING DURING THE ECLAMPTIC STATE*

BY E. D. PLASS, M.D., DETROIT, MICH.

Henry Ford Hospital

CLINICIANS usually employ the term "eclampsia" to designate the occurrence of general convulsions during the later months of pregnancy, at the time of labor, or during the early days of the puerperium, when such seizures are accompanied by edema, high blood pressure, albuminuria, headache and visual disturbances. Pathologically, however, these cases are divisible into two main groups, depending upon the demonstration of a permanent, and probably pre-existing, chronic nephritis. When such a lesion does not exist, a liver necrosis may be found if the patient comes to autopsy, although most pathologists will admit that it is quite inconstant and may, therefore, be secondary. Upon this basis a differentiation into hepatic and renal types has been attempted without any conspicuous success. From the standpoint of the practitioner a differentiation is important, because it helps him to give a more reliable prognosis as to probable occurrences in subsequent pregnancies, even though it does not aid him in meeting the immediate crisis. Thus far only one absolute sign has been discovered—albuminuric retinitis—and it is only of value when it is positive, since its absence does not remove the possibility of a chronic nephritis. From the scientific viewpoint, correct diagnosis would be of value in that it might open up new methods of approaching the etiology of these baffling cases.

Considering, for the time, the whole group of so-called late toxemias, certain facts become prominent: a pronounced increase in intraabdominal pressure—as occurs in primiparous women, in multiple pregnancy, and in hydramnios—predisposes to the development of, or at least is associated with, the hepatic type, while the presence of an impairment of kidney function probably precedes the appearance of the renal type, and certainly dominates the clinical picture. In spite of these rather essential anatomical differences, it is frequently impossible to effect a differential diagnosis at the time of the attacks, since the clinical manifestations are practically identical. It would, therefore,

*Presented at the Annual Meeting of the Association for Research in Nervous and Mental Diseases, New York City, December 27, 1922.

seem that there must be a further common etiologic factor, which may be excited by overdistention or by renal insufficiency.

Inasmuch as the condition occurs only during pregnancy it has been natural to seek for some substance derived from the growing product of conception, which may disturb the organism, either by reason of the body's inability to neutralize it—the hepatic type—or, because it cannot be satisfactorily eliminated by the diseased kidneys—the renal type. This has led to the assumption that there is a specific toxin, and the adoption of a general term "toxemia of pregnancy," as a cloak for our ignorance.

It is extremely difficult to find statements as to the possible nature of this hypothetic toxic substance, although, the general opinion seems to be that it is an organic poison elaborated by the fetus or placenta. An enormous amount of work has been done along this line, but the toxin remains undiscovered and, moreover, there is no good evidence to prove that it really exists. While it is possible that such a substance may be the ultimate cause of the condition, research in other directions should help make clear the intermediate phases about which little is known.

The available clinical facts indicate quite certainly that the underlying etiologic factor is probably operative in all normal pregnancies, and that certain disturbances of the ordinary protective mechanism serve to precipitate the appearance of untoward symptoms. From this point of view it is not surprising that certain patients should exhibit some of the laboratory and clinical manifestations of the condition without actually being included in the group. The boundary between the physiologic and pathologic is usually extremely narrow in pregnant women, as in all other individuals, and probably the best evidence of this borderline state is the edema of pregnancy. Practically every pregnant woman has more or less edema of the lower extremities during the latter months of gestation. This is usually considered as due to pressure of the enlarged uterus upon the veins draining the legs and, therefore, purely physiologic, unless it happens to be accompanied by an increased blood pressure or a trace of albumin in the urine, when it becomes an evidence of toxemia, even though not demonstrably more intense. The more modern view is that this so-called physiologic condition is due to the same factor as the later pathologic, but that, in the first instance, it is not progressive and, therefore, does not lead to the other signs and symptoms which are needed to complete the picture of toxemia. Undoubtedly this mild edema is accompanied by the same metabolic changes which characterize the more severe grades of swelling, the only difference being one of degree.

In the last century it was discovered that there were certain disturbances of nitrogen metabolism in the toxemias of pregnancy, as evidenced by alterations in the composition of the urine, and, from these older researches, the theory of a primary derangement of the protein metabolic processes was developed. This hypothesis became so thoroughly entrenched that even now its advocates will juggle the facts to explain its impossibilities. Bailey¹ in 1913 stated the case very succinctly when he wrote of the urinary changes, that "it is probable that except for a lowering of the total nitrogen and changes in the various fractions due to the diet and the amount of absorption,

the nitrogen partitions in eclampsia will show no great differences in relationship." Losee and Van Slyke² in 1917 disposed of the later deaminization theory when they expressed the conviction that the toxemias of pregnancy cannot be attributed to the failure in deaminization of the aminoacids. While it is true that much of this work was done under such poorly controlled conditions, incident to the difficulties encountered, that it can scarcely be considered satisfactory, the utter negativity of the results must be considered as rendering these hypotheses quite untenable.

More recently the development of microchemical methods for the study of the various blood constituents has stimulated many workers to search for evidence of their unusual retention in explanation of the uremia-like character of the eclamptic state. Various observers have differed somewhat in their findings but more in their interpretations, so that one, who merely depends upon the published reports, is at a loss to learn whether nitrogen retention is significant or not. From our own work upon a large number of cases, we must admit that we are still unable to interpret our results diagnostically or prognostically. This is quite at variance with Killian,³ who believes that he can differentiate the hepatic and renal conditions by the results of blood chemical studies. It is his contention that in the former there is a retention of nonprotein nitrogen without a corresponding increase in the urea nitrogen fraction, so that the urea percentage is lower than normal. While this is undoubtedly true in some cases, we have seen a number of patients in whom a high urea percentage has been associated with a true hepatic toxemia, and, moreover, a few women with definite renal involvement have shown a urea percentage well within normal limits. We have never seen the unusually low urea values reported by this observer, and can find no confirmation of them in the literature.

The consensus of opinion then, seems to be that there is no uniform retention of the nitrogenous materials of the blood in the toxemias of pregnancy, and that attempts to differentiate the two types upon the basis of these findings are at best most uncertain. Although the results have not been uniform, the absence of a constant accumulation of any one constituent has generally led to abandonment of the blood-retention hypothesis, so enthusiastically discussed a few years since.

The first investigator definitely to enter a new field of metabolic attack was Zangemeister,⁴ who, in 1919, abandoned the organic toxin idea and elaborated his hydrops gravidarum theory, which led him to the conclusion that water is the eclamptic poison. Essentially his argument is as follows: There is an initial retention in the system of water, which gradually infiltrates the tissues until they become edematous. After this the blood pressure rises and the kidney begins to eliminate albumin, while finally involvement of the brain produces the chief nervous symptoms—convulsions and coma. He further asserts that "the primary cause of the edema is an injury to the capillary endothelium which manifests itself in increased permeability and diminished absorptive ability," although he maintains that these changes in the capillary wall are only indirectly associated with the etiology of eclampsia. The evidence which is advanced has chiefly to do with the hydremia or hydroplasmia, which is present in these cases and which disappears when the condition is relieved.

There can be no doubt of the general truth of his statements, and we have abundantly confirmed the occurrence of a definite blood dilution, upon which his theory rests. According to Tranter and Rowe⁵ the serum protein is generally higher in women than in men. We have found normal values in early pregnancy, but from about the middle of the gestation period the values tend to become progressively lower until they reach a normal minimum just before labor. During parturition the blood plasma becomes more concentrated (higher protein percentage), but in the first forty-eight hours after delivery there is a second and more rapid dilution, followed by a gradual return to normal. These changes in the serum protein concentration appear to be a reliable index of the changing plasma volume, and thus confirm other work which indicates an increased blood content during the latter part of pregnancy.

In the course of the late toxemias, there is usually a still more marked grade of hydremia, which appears to be roughly proportional to the extent of the edema—the more marked the swelling, the lower the protein concentration. From the clinical observation that patients with extreme edema have a better prognosis than those with no swelling, it might be argued that the general retention of water is a prophylactic measure, adopted by the organism to combat the underlying disturbance, whatever it may prove to be. Furthermore, preeclamptic patients generally present lower values for the serum protein than do those with convulsions, a fact which may be interpreted to indicate that convulsions appear only when the other protective mechanisms have failed to effect the necessary improvement. The analogy with normal pregnancy can be carried still farther, because toxic patients show in general the same increase in serum protein during labor, and a similar rapid dilution soon after delivery. In fact, the curves for the normal and pathologic are quite alike, although one is at a lower level than the other.

It may well be that this plasma dilution explains certain other findings which are otherwise rather difficult to interpret. The very low values for the nonprotein nitrogenous constituents generally found in normal pregnancy and frequently in the toxemias may thus be viewed as the result of a simple dilution, while the increased percentage of chlorides may be looked upon as a mechanism for maintaining the osmotic pressure of the blood, which would otherwise become abnormally low. In like manner the low serum calcium may be explained by simple dilution, although it is conceivable that it may be due indirectly to the high chloride concentration.

As has previously been stated, we have found in the majority of true eclampsies, as well as in certain of the nephrities, that the nonprotein blood constituents are in normal concentration during the height of the attack, except the uric acid which tends to be increased. If only single determinations are made, it will be assumed that there is no retention of these substances anywhere in the body, but if blood is drawn at daily intervals during the convalescent period, it will be found that, as recovery proceeds, there is a distinct tendency for the nonprotein nitrogen to rise during the first forty-eight hours and then to return to normal. The therapeutic procedure, which inaugurates the improvement, apparently makes little difference, since the same sort of curve has been obtained after delivery, venesection and mor-

phine. The first named undoubtedly produces the most definite results, as might be expected from its greater efficacy as a remedial measure. Apparently, also, the degree of this increase of the blood nitrogen and the rapidity with which normal values are approached, varies with the severity of the toxemia and the rate of clinical improvement.

Ordinarily, a normal convalescence is not associated with such changes in the blood chemistry, although in one instance, a similar curve was obtained in a patient who showed no signs of a toxemia, but who had complained of occasional severe headaches during the latter part of pregnancy.

As a rule, the rise in the total nonprotein nitrogen is accompanied by an increase in the urea nitrogen and the uric acid, and also in the percentage of nonprotein nitrogen in the form of urea. Moreover, a few determinations would indicate that the CO_2 combining power is somewhat similarly affected. Observations similar to our own have been made previously, but have not been followed up. Thus, Morse,⁶ 1917, when discussing the aminoacid nitrogen of the blood in eclampsia, says, "Occasionally, in my series, values slightly higher than normal were associated with the period of convalescence. Thus, in Case 18, there was a progressive increase in the aminoacid nitrogen during the first and second days after delivery." And again, the protocols of Caldwell and Lyle⁷ show that they encountered the same thing in a few of their patients upon whom repeated analyses were made.

A definite explanation for this increase in the nonprotein fraction of the blood plasma in the presence of a considerable dilution of the plasma itself has not been forthcoming. It was at first thought that it might be due to some normal process associated with involution of the uterus, but there is ordinarily so little evidence of retention in the blood of normal women during the early puerperium that this idea is hardly tenable. A later thought was that there might be a concentration of the blood, and that the higher values were incident to this, but, as has already been indicated, the blood actually becomes more dilute during this period. These changes are, moreover, associated with a profuse polyuria, which would indicate that the kidneys are functioning much more rapidly than previously, so that it seems rather far fetched to ascribe them to renal insufficiency.

One other possibility, however, presents itself—that the fluid which has been attracted into the tissues to produce the edema contains a higher percentage of nitrogenous nonprotein materials than the plasma itself. Under such conditions, it is obvious that any procedure which tends to relieve the edema would automatically raise the concentration of nitrogenous waste products in the blood, and would, at the same time, lower its protein percentage, since tissue juices are always relatively poor in albuminous materials. This hypothesis is so directly opposed to the prevalent idea that crystalloid substances, and, more especially, urea, tend to maintain similar concentrations in all body fluids that it can hardly be accepted without very detailed proof. Since it is impracticable to remove any tissue from these patients for analysis, confirmation of the idea can scarcely be anything but indirect. Hammett,⁸ however, by utilizing the one tissue which is available, the placenta, demonstrated that in toxic patients this organ

contains more urea than normal, but he unfortunately made no parallel blood analyses.

A single experiment of our own may be of interest in this connection: During a therapeutic venesection for 700 c.c., the first and last 50 c.c. samples of blood were collected separately and analyzed simultaneously. The second specimen contained somewhat more total non-protein nitrogen even though there was a considerable drop in the protein percentage, while the changes in the urea and uric acid were too small to be of significance. It is probable that this was a purely mechanical result of the bleeding, since a marked metabolic change could hardly have occurred in the twenty minutes which had elapsed. The mechanism involved is supposedly quite simple, for it is well proved that the plasma volume tends to be restored immediately when any considerable amount of blood is removed from the circulation. This extra fluid is drawn from the most available store, usually from the tissue juices.

This idea of tissue retention does not permit us to say the final word on the etiology of eclampsia and preeclampsia, even if it is confirmed, but it does open up interesting speculative fields. If we admit the capillary changes, and there is very good evidence that they occur, it is conceivable that the endothelium is so altered that it permits the tissues to absorb more than their normal percentage of various crystalloid substances. This disturbs the usual osmotic relations, so that water is drawn from the blood and the tissues become edematous. The circulating blood now becomes more dilute, as is evidenced by the low hematocrit. Thus, the edema assumes the rôle of a protective mechanism, and the clinical fact that patients with marked edema are more likely to recover than those who show no appreciable swelling has a definite explanation. It should be remembered in this connection that several liters of fluid must be held in the tissues before it becomes manifest as clinical edema.

This increase in the tissue fluids naturally augments the resistance offered to the flow of the blood, so that the blood pressure rises in order to assure a satisfactory circulation. In true eclampsia, subsidence of the edema is accompanied by a lowered arterial pressure, whereas an increased swelling generally produces a rise.

Since we know so little of the kidney lesion which permits an albuminuria, it is perhaps dangerous to carry the hypothesis farther, but it is conceivable that these organs also become edematous and that the albumin is excreted in an effort to bring the osmotic relationship of the blood and tissues back to normal, thus also being protective in nature.

The other symptoms, headache, epigastric pain and visual disturbances, may well be referred to edema, and there is no doubt from our pathologic studies that edema of the brain is an almost invariable finding at autopsies on eclamptic patients. Moreover, edema of the lungs is one of the most dreaded complications. It would seem then that water retention may, as Zangemeister insists, well be an essential factor in the production of the symptom complex.

It can scarcely be assumed that these variations are fundamental, since the etiology of the capillary alterations is still unexplained. Back of them there must be another etiologic factor, about which little is suspected and less known. It may be a specific toxic sub-

stance, although this view has little support at present, or it may be a much more commonplace thing which has not been suspected. We believe, however, that the toxemias of pregnancy are merely the extremes of physiologic processes, which are inherent in pregnancy, but which for some reason cannot be controlled in certain individuals.

Thus far, no definite metabolic changes have been associated with the actual convulsive seizures, and except for the frequent occurrence of increased pressure of the cerebrospinal fluid and the postmortem demonstration of cerebral edema, we have no clues as to their etiology. We have been inclined, however, to look upon them as efforts on the part of organism to overcome the unknown condition, which is their actual cause, and have, therefore, subscribed to the view that one should actively combat the underlying disturbance rather than attempt to control the convulsions.

BIBLIOGRAPHY

- (1) *Bailey, H. C.*: Am. Jour. Obst., 1913, lxviii, 263. (2) *Loose, J. E.* and *Van Slyke, D. D.*: Am. Jour. Med. Sc., 1917, cliii, 94. (3) *Killian, J. A.*: quoted in "The Toxemias of Pregnancy"—By G. W. Kosmak—Appleton & Co., New York, 1922. (4) *Zangemeister, W.*: Ztschr. für Geburtsh. und Gynäk., 1919, lxxxi, 491. (5) *Tranter, C. L.* and *Rowe, A. H.*: Jour. Am. Med. Assn., 1915, lxv, 1433. (6) *Morse, A.*: Bull. Johns Hopkins Hospital, 1917, xxviii, 199. (7) *Caldwell, W. E.* and *Lyle, W. G.*: AM. JOUR. OBST. AND GYNEC., 1921, ii, 17. (8) *Hammett, F. S.*: Jour. Biol. Chem., 1918, xxxiv, 515.

Item

The Forty-ninth Annual Meeting of the American Gynecological Society will be held in Hot Springs, Va., May 15, 16 and 17, 1924.

Books Received

GYNECOLOGICAL AND OBSTETRICAL MONOGRAPHS. D. Appleton & Company, New York, N. Y.

DISEASES OF THE VULVA. By Frederick J. Taussig, M.D., Associate Professor, Clinical Gynecology, Washington University Medical School, St. Louis.

SYMPTOMS IN GYNECOLOGY. ETIOLOGY AND INTERPETATION. By Isidor C. Rubin, M.D., Attending Gynecologist Montefiore, Mount Sinai and Beth Israel Hospitals, New York.

NON-OPERATIVE TREATMENT IN GYNECOLOGY. By George Gellhorn, M.D., Professor of Gynecology and Obstetrics, St. Louis University School of Medicine.

SURGERY OF FEMALE PELVIS. By Carey Culbertson, M.D., Assistant Professor of Obstetrics and Gynecology, Rush Medical College, Chicago.

COMPLICATIONS OF PREGNANCY. By Edward P. Davis, M.D., Professor of Obstetrics, Jefferson Medical College, Philadelphia.

MANUEL DE L'ACCOUCHEUR. By L. A. Demelin, Professeur en chef a la Maternite de Paris, etc., and L. DeVraigne, chef de Service a la Maternite de l'hospital Laricossiere, etc. With 465 figures in the text. Librairie Octave Doin, Paris, 1924.

CHARLES WHITE OF MANCHESTER (1728-1813) AND THE ARREST OF PUERPERAL FEVER, WITH WHICH ARE REPRINTED CHARLES WHITE'S PUBLISHED WRITINGS ON PUERPERAL FEVER. By J. George Adami, C.B.E., M.D., F.R.S. Paul B. Hoeber, Inc., New York, 1923.

HERNIA, ITS ANATOMY, ETIOLOGY, SYMPTOMS, DIAGNOSIS, DIFFERENTIAL DIAGNOSIS, PROGNOSIS AND OPERATIVE TREATMENT. By Leigh F. Watson, M.D., Associate in Surgery, Rush Medical College, Chicago, Ill. With 232 original illustrations. C. V. Mosby Company, St. Louis, 1924.

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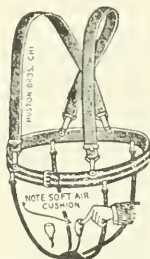
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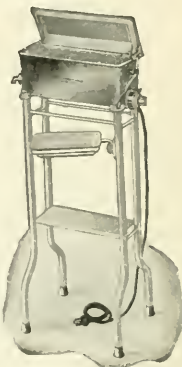
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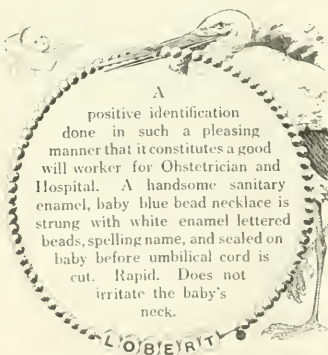


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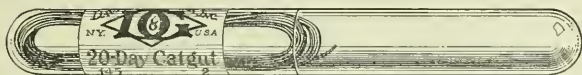
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Claustro-Thermal catgut is aseptic though not germicidal. Not being impregnated with any bactericidal substance, it is inert in the tissues, exerting no inhibitive action.

These sutures are boilable. The tubes even may be autoclaved up to 30 pounds pressure for sterilizing their exterior preliminary to use. The heat sterilization procedure is described on the following page.

VARIETIES OF CLAUSTRO-THERMAL CATGUT

Each Tube Contains Approximately Sixty Inches

Plain Catgut.....	No. 105
10-Day Chromic Catgut.....	No. 125
20-Day Chromic Catgut.....	No. 145
40-Day Chromic Catgut.....	No. 185

SIZES: 000...00...0...1...2...3...4

In packages of twelve tubes of one kind and size

List Price per dozen tubes (in U. S. A.).....\$3

A wholesale discount of 25% is allowed on one gross or more (\$27 net per gross); carriage paid



Kalmereid catgut imbedded in agar infected with *Staphylococcus pyogenes aureus*



Iodized catgut imbedded in the same medium. Note the proximity of colonies

Kalmereid Catgut Antiseptic

KALMERID CATGUT is an improved germicidal suture superseding iodized catgut.³ It is not only sterile, but, being impregnated with potassium-mercuric-iodide—a double iodine compound—the sutures exert a local bactericidal action in the tissues.⁴ It differs from the Claustro-Thermal catgut only in this respect.¹¹

The serious disadvantages of iodized catgut—deterioration, irritation, and impaired tensile strength—have been overcome through the use of potassium-mercuric-iodide instead of iodine. Unlike iodine, it does not break down under the influence of light or heat, it is chemically stable, and it is neither toxic nor irritating to the tissues. It interferes in no way with the absorption of the sutures, and is not precipitated by the proteins of the body fluids.^{5,6,7}

These sutures are boilable. The tubes even may be autoclaved up to 30 pounds pressure for sterilizing their exterior preliminary to use. The heat sterilization procedure is described on the following page.

VARIETIES OF KALMERID CATGUT

Each Tube Contains Approximately Sixty Inches

Plain Catgut.....	Boilable Grade.....	No. 1205
10-Day Chromic.....	Boilable Grade.....	No. 1225
20-Day Chromic.....	Boilable Grade.....	No. 1245
40-Day Chromic.....	Boilable Grade.....	No. 1285

SIZES: 000...00...0...1...2...3...4

In packages of twelve tubes of one kind and size

List Price per dozen tubes (in U. S. A.).....\$3

A wholesale discount of 25% is allowed on one gross or more (\$27 net per gross); carriage paid

Kalmereid catgut is made also in an extra flexible grade, which is non-boilable, and which is described on the following page.

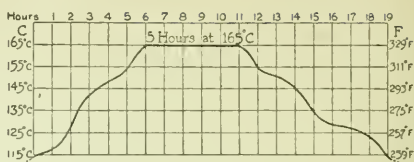
GERMICIDAL EFFICIENCY AS COMPARED WITH IODIZED CATGUT

The marked inhibitory power of Kalmereid catgut, as compared with iodized sutures, is strikingly shown in these reproductions of culture plates. The lighter areas about the imbedded sutures represent zones of no bacterial growth, while the darker portions are masses of *Staphylococcus* colonies. It is evident that Kalmereid sutures exert in the tissues a far greater antiseptic action than do the usual iodized sutures.^{4,7,11}

See Advertisement on Inside of Front Cover

Method of Sterilization

BOTH Claustro-Thermal and the boilable grade of Kalmerid catgut, described on preceding page, are subjected to the same sterilizing procedure: the sealed tubes are submerged in a bath of cumol and there exposed for five hours to the rigorous temperature of 165° C. (329° F.).¹ It is obvious that sterility is absolutely assured. Rigid bacteriologic control is maintained.



Kalmerid Catgut—(Non-Boilable Grade) Extra Flexible

THE NON-BOILABLE grade of Kalmerid catgut differs from the boilable variety described on the preceding page in that it possesses extreme flexibility—a characteristic sometimes desired by surgeons accustomed to the use of iodized catgut.⁷ It is impregnated with potassium-mercuric-iodide, causing the sutures to exert a local bactericidal action in the tissues.¹¹

Potassium-mercuric-iodide is the double salt of iodine and mercury,⁶ the chemical formula of which is $HgI_2 \cdot 2KI$. Through its use the serious disadvantages of iodized catgut—deterioration, irritation, and impaired tensile strength—have been overcome.³ It is one of the most active germicides known, exerting a killing action on bacteria about ten times greater than that of iodine.^{4,5} Physiologically it is bland and is entirely compatible with the tissues, not being precipitated by the proteins of the body fluids.

VARIETIES OF THE NON-BOILABLE GRADE OF KALMERID CATGUT

Each Tube Contains Approximately Sixty Inches

Plain Catgut.....Non-Boilable Grade....No. 1405
10-Day Chronic.....Non-Boilable Grade....No. 1425
20-Day Chronic.....Non-Boilable Grade....No. 1445
40-Day Chronic.....Non-Boilable Grade....No. 1485

SIZES: 000...00...0...1...2...3...4

In packages of twelve tubes of one kind and size

List Price per dozen tubes (in U. S. A.).....\$3

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Kalmerid Kangaroo Tendons Boilable - Non-Boilable

KALMERID KANGAROO TENDONS are the sutures par excellence for those procedures in which post-operative tension is extreme, or long continued apposition necessary, such as in herniotomy, and in tendon or bone suturing. They are not only sterile, but, in addition, are impregnated with potassium-mercuric-iodide, as in Kalmerid catgut, which enables them to exert a local bactericidal action in the tissues.^{3,4,11}

They are genuine kangaroo tendons; they are smooth, straight, of uniform contour, and possess a tensile strength about twice that of catgut.

The tendons are chromicized, and so accurately is the process regulated that each size will maintain apposition in fascia or in tendon for approximately thirty days.⁸

Kalmerid kangaroo tendons are prepared in two grades—boilable and non-boilable. The latter are extremely pliable.⁷

VARIETIES AND SIZES

Non-Boilable are Product No. 370
The Boilable are Product No. 380

Each Tube Contains One Tendon
Lengths Vary From 12 to 20 Inches

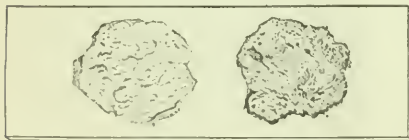
SIZES: 0...2...4...6...8...16...24

In packages of twelve tubes of one kind and size

List Price per dozen tubes (in U. S. A.).....\$3

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THE PERMEATION OF KALMERID SUTURES BY POTASSIUM-MERCURIC-IODIDE



The lighter shaded specimen is a cross section of a strand of plain Kalmerid catgut, highly magnified.

The darker shaded specimen is a cross section of the same strand reacted upon by ammonium sulphid to precipitate the mercuric element.

The uniform color throughout the darker section shows the thorough permeation by the potassium-mercuric-iodide, the equable distribution of which assures a supply of this germicidal substance in the tissues until the suture is entirely absorbed.

General Qualities of All D&G Sutures

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accuracy of sizes, flexibility, and absolute sterility. They are unaffected by age or light, or by extremes of climatic temperatures.

Various Non-Absorbable Sutures

Heat Sterilized After Closure of Tubes—Boilable

Product No.	Approximate Quantity in Each Tube	Standard Sizes
350..Celluloid-Linen Thread..60 Inches.....	000, 00, 0	
360..Horsehair.....4 28-In. Sutures.....	00	
390..Plain Silkworm Gut.4 14-In. Sutures.....	00, 0, 1	
400..Black Silkworm Gut.4 14-In. Sutures.....	00, 0, 1	
450..White Twisted Silk.....60 In.....	000, 00, 0, 1, 2, 3	
460..Black Twisted Silk....60 In.....	000, 0, 2	
480..White Braided Silk....60 In.....	00, 0, 2, 4	
490..Black Braided Silk....60 In.....	00, 1, 4	

In packages of twelve tubes of one kind and size

List Price per dozen tubes (in U. S. A.).....\$3

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Sutures For Minor Surgery

Heat Sterilized After Closure of Tubes—Boilable

Product No.	Approximate Quantity in Each Tube	Standard Sizes
802..Plain Catgut, Kalmerid...20 In.....	00, 0, 1, 2, 3	
812..10-Day Catgut, Kalmerid.20 In.....	00, 0, 1, 2, 3	
822..20-Day Catgut, Kalmerid.20 In.....	00, 0, 1, 2, 3	
862..Horsehair.....2 28-In. Sutures.....	000	
872..Plain Silkworm Gut.2 14-In. Sutures.....	0	
882..White Twisted Silk.....20 In.....	000, 0, 2	

In packages of twelve tubes of one kind and size

List Price per dozen tubes (in U. S. A.).....\$1.50

Wholesale discount of 25% allowed on gross or more; carriage paid

Sutures With Needles

Heat Sterilized After Closure of Tubes—Boilable

Product No.	Approximate Quantity in Each Tube	Standard Sizes
904..Plain Catgut, Kalmerid...20 In.....	00, 0, 1, 2, 3	
914..10-Day Catgut, Kalmerid.20 In.....	00, 0, 1, 2, 3	
924..20-Day Catgut, Kalmerid.20 In.....	00, 0, 1, 2, 3	
964..Horsehair.....2 28-In. Sutures.....	000	
974..Plain Silkworm Gut.2 14-In. Sutures.....	0	
984..White Twisted Silk.....20 In.....	000, 0, 2	



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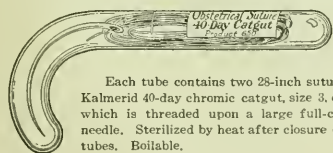
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Each tube contains two 28-inch sutures of Kalmerid 40-day chromic catgut, size 3, one of which is threaded upon a large full-curved needle. Sterilized by heat after closure of the tubes. Boilable.

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Each tube contains a 30-inch suture of Kalmerid plain catgut, size 00, threaded upon a small full-curved needle.

In packages of twelve tubes

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Heat Sterilized After Closure of Tubes—Boilable



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In packages of twelve tubes

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00	recognized need for a
0	unified system of sizes, the
1	standard scale of catgut sizes
2	now embraces all sutures, in-
3	cluding silk, horsehair, silk-
4	worm gut, celluloid-linen
6	thread, and kangaroo tendons
16	(only the latter occurring in
24	sizes 6, 8, 16, and 24).

Bibliography

- 1 AN IMPROVED METHOD FOR STERILIZING CATGUT SUTURES. By Cassius H. Watson, B.S., M.D. Surg., Gyn. & Obstet., Sept. 1919.
- 2 TOLUOL: ITS ADVANTAGES OVER CHLOROFORM OR ALCOHOL AS A STORING FLUID FOR SURGICAL CATGUT. By Allen Rogers, Ph.D. Annals of Surgery, March 1916.
- 3 AN IMPROVED SUBSTITUTE FOR IODIZED CATGUT SUTURES. By Cassius H. Watson, B.S., M.D. Surg., Gyn. & Obstet., Jan. 1916.
- 4 AN IMPROVED SUBSTITUTE FOR IODIZED CATGUT SUTURES—II. BACTERIOLOGICAL TESTS. By Cassius H. Watson, B.S., M.D. Surg., Gyn. & Obstet., Nov. 1916.
- 5 THE GERMICIDAL VALUE OF POTASSIUM MERCURIC IODIDE. By Douglas Macfarlan, M.D. Amer. Jour. Med. Sci., April 1920.
- 6 POTASSIUM-MERCURIC-IOIDIDE—ITS NATURE, ACTION, AND USES. Davis & Geck, Inc., 1920.
- 7 KALMERID—AN IMPROVED CATGUT TO SUPERSEDE IODIZED SUTURES. Davis & Geck, Inc., 1916.
- 8 THE ABSORPTION AND TENSILE STRENGTH OF CERTAIN ABSORBABLE ANIMAL LIGATURES. By Gray Phillips, M.D. Jour. A. M. A., April 25, 1914.
- 9 CHROMICIZED CATGUT PREPARED TO RESIST ABSORPTION FOR DEFINITE PERIODS. Davis & Geck, Inc., 1916.
- 10 ABSORBABLE ANIMAL LIGATURES. By Thomas A. Berryhill, M.D., Medical Director, United States Navy. U. S. Naval Medical Bulletin, July 1913.
- 11 D&G SUTURES—A COMPLETE DESCRIPTION OF METHODS. 48 pages. Davis & Geck, Inc., 1923.

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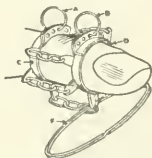
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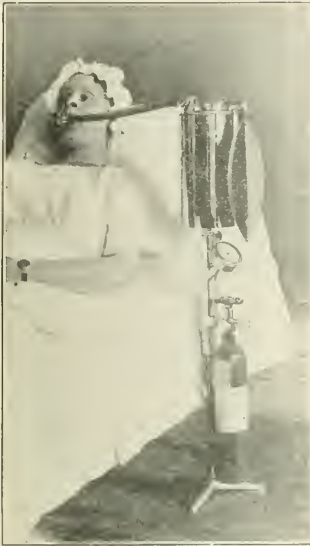
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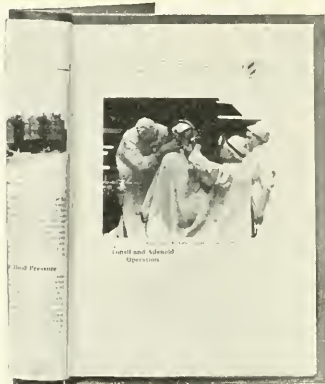
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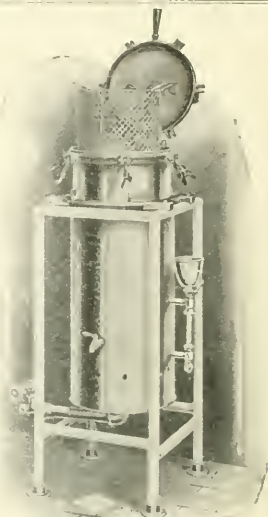
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Original Communications

PLACENTAL CIRCULATION*

BY JOHN FRASER, M.D., MONTREAL, QUEBEC

THE natural life history of organs is one of constant change, both in tissue organization and cell change. The cyclic changes in the uterine mucosa and striking alterations in the coronary artery circulation with each decade are but instances of this structural fluidity of organs. The proper interpretation, therefore, of any given change lies in its comparison with that of a known age period.

Much of our knowledge of the placenta has been adduced from investigation of the growth, disposition and change in its epithelium, as befits a glandular organ. Comparatively little attention has been directed to the circulatory changes. When one recalls its essential vascular construction, a large glomerulus, as a direct continuation of the dorsal aorta of the fetus, it follows that considerable importance must be attached to the behavior of these vessels.

The main differences between the young and old placenta are the anatomic changes which are aptly termed degenerative, a physiologic vascular senescence. These changes are best seen at term when the placenta is definitely a senile organ barely able to sustain its physiologic activities and soon to be repudiated alike by mother and fetus.

The combination of the x-ray with the injection of the vascular tree of various organs has accomplished much in the elucidation of their vascular architecture. Formerly injection methods were combined with serial sections in reconstruction efforts, but this was confined to the finer or microscopic circulation. Latterly injection plus dehydration has revealed the true nature of the coarse circulation,

*Read by invitation, at the Forty-eighth Annual Meeting of the American Gynecological Society, Hot Spring, Va., May 21-23, 1923.

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FIG. 1.—Arterial injection 4½ months' placenta, showing large subamniotic vessels.

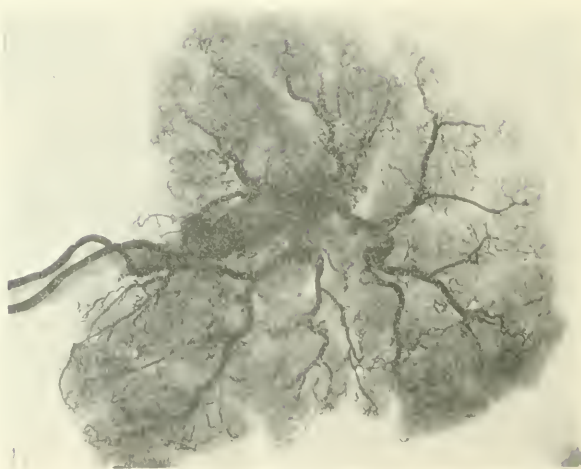


FIG. 2.—Arterial injection of mature placenta, showing the large subamniotic branches as well as the finer cotyledonous circulation. The wide spread anastomoses both on the surface of the placenta and in its substance are clearly shown. The large bore of the vessels on the surface is characteristic.

and if to this one adds the stereoscopic radiogram, the whole vascular tree is shown in proper perspective.

The present study was undertaken with a view of establishing the architecture of the healthy as well as the diseased placenta, and of observing the vascular changes in the different age periods. To ac-

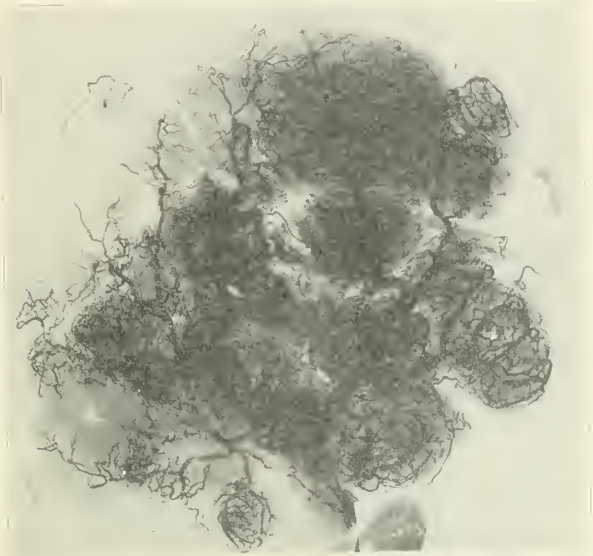


Fig. 3.—A more mature but at the same time healthy placenta showing some reduction in the bore of the large subamniotic trunks, a visible contraction of the cotyledonous circulation with beginning areas of degeneration.



Fig. 4.—Cross section of placenta with arterial injection to show the shrinkage of the cotyledons. The uniform thickness of the placenta is still preserved.

complish this the vascular tree was injected in many placentae of varying degrees of development, stereoscopic radiograms were taken of them, and later these specimens were dehydrated and cleared.

The technic employed requires little mention, the apparatus being similar to that described by Gross in injections of other organs. The



Fig. 5.—Several sections of the same placenta showing the different stages of infarction. The thickening of the fine cotyledonous vessels with a loss of the usual whorled arrangement is clearly depicted.



Fig. 6.—Arterial injection of a placenta at term of a healthy child. A widespread senescence is visible in the irregularity of the large surface trunks, the stripping of their many branches and a great diminution in number of the fine cotyledonous vessels. The margins of the placenta are almost deprived of their circulation.

injection mass which seemed most applicable and yielded the best results was barium in gelatin. The specimens were all dealt with in a similar manner. They were obtained as soon as possible after birth, the blood was removed by gentle massage and saline irrigations, as completely as possible, they were then injected at standard



Fig. 7.—Cross section of a syphilitic placenta showing the immense thickening of the placenta itself. The irregularity in the arterial distribution is well shown.

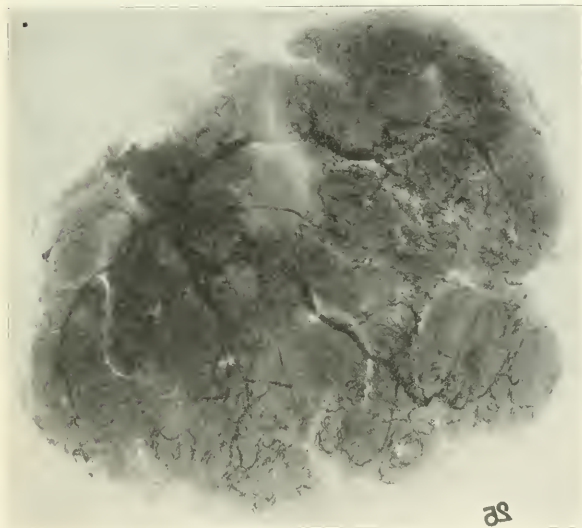


Fig. 8.—Arterial injection of a placenta in nephritic toxemia. There is widespread infarction and extensive vascular degeneration.

pressure and temperature, either by the arterial or venous route, or both, and then fixed by immersion in formalin for 48 hours. Following the x-ray selected specimens were dehydrated and cleared. The uniformity of this method diminishes to a great extent the danger of artefact and permits of some generalization in the final analysis. As

a result of these radiographic observations one may consider the vascular arrangement in the placenta from three view points:

1. That of the young active placenta.
2. That of the mature or ripe placenta.
3. That of the diseased placenta.

1. In the young immature placenta the vascular tree, as Boussin and Brindeau have shown, is regular and orderly in arrangement, the large divisions lying on the fetal surface of the placenta (subamniotic branches) ending usually near the placental margins in the deep or perpendicular vessels, which are to form the mural circulation. The

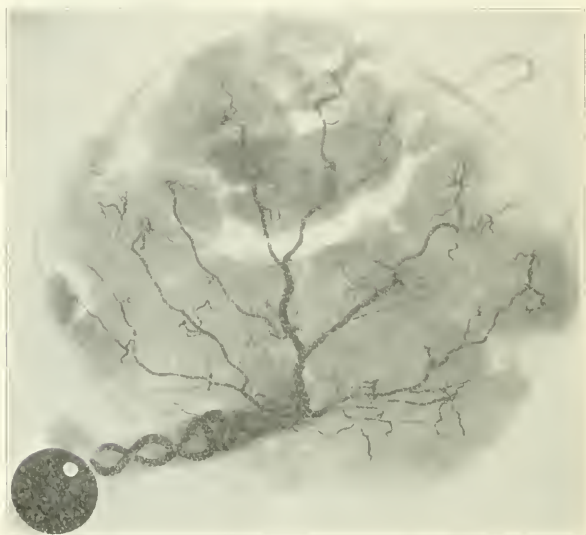


Fig. 9.—Arterial injection of a placenta of a macerated fetus. Circulation is still present in the large trunks.

main arteries as a general rule separate on leaving the cord, and pass one to each half of the organ, less frequently the central portion is supplied by a large artery and the periphery by a smaller one. These vessels, irrespective of arrangement, pursue a tortuous course over the fetal surface, spreading with their branches like the spokes of a wheel to every quadrant of the placenta, disappearing into their respective cotyledons near the placental margins. At times they encircle the edge of the placenta and in the very early stages it is not unusual to see a small branch pass as a loop onto the free surface of the chorion. Hyrtl interprets this as a persistence of the vascularization of the

chorion laeve, and is suggestive of the presence even early of a widespread physiologic vascular degeneration. With the dipping of these large trunks into the cotyledons the vessels change rapidly—the bore is rapidly reduced and the vessels rapidly divide into the innumerable lobular branches of the cotyledons. The stereoscope reveals a backward tilting of the vessels toward the center of the placenta.

The ultimate arrangement of the finer vessels of cotyledons has been variably described. The usual outlines are glomerular or tuft-like,

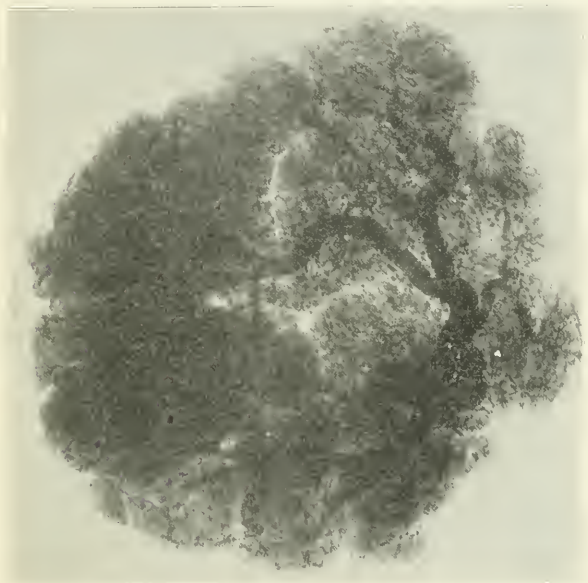


Fig. 10.—Venous injection of a healthy placenta. The cotyledonous circulation is extremely dense permitting of little or no differentiation.

myriads of vessels intertwining each other, in others umbrella-like, while in others they are almost as a palisade. The anastomoses are very free both in the larger or subamniotic branches, and likewise in the deeper substance of the placenta proper. This was early perceived in the rapidity of return flow through the one artery when the other was injected—that this occurs as well in the deeper structures one may note by injection of a large branch near its point of submergence—when the whole structure becomes rapidly injected. A point of interest is the rapidity of return of the saline by the vein when one or both arteries are injected. It has been possible to point this out with

bismuth, one may push the injection mass over from one circulation to the other.

The venous circulation is, as a rule, somewhat simple, the large umbilical vein at the insertion of the cord divides rapidly into two, three, or more branches of varying size. These are the main subamniotic branches, they are at a deeper level than the arteries, more distended and have many finer branches. In a sense they trail the arteries and dip into the substance of the placenta where they freely anastomose with neighboring trunks, and then break into immense clusters of fine vessels which resemble the falling spray of a fountain. This is decidedly more intricate than the arterial display and suggests a wide collecting system. From the rapidity of return flow through veins of irrigating saline it seems allowable to infer the presence of a shallow capillary bed.

2. The mature or ripe placenta shows some complexity of structure, both in the larger trunks and terminal vessels, as well as showing the presence here and there of areas of degeneration, which from their small size and comparatively little effect on the fetus cannot be more than evidence of physiologic senescence.

In the young placenta one emphasizes the regular and orderly arrangement of vascular tree from the large trunks to the terminal distribution. In the riper or more mature one sees the regressive changes; the large vessels at times present a beaded appearance and are apt to diminish irregularly in size. There is a conspicuous diminution in number of small branches or lateral anastomoses.

The arrangement and size of cotyledons are determined largely by the chorionic villi,—speaking generally, each cotyledon corresponds to a villus, which with its branches, fills the cavity of the cotyledon and is attached by numerous anchoring villi to basal plate and septa. It therefore follows that as the villus is largely a vascular structure its size and behavior will be regulated by its blood volume. One finds in these mature placentae a contraction or shrinkage in size of some cotyledons, even though possessed of an indifferent circulatory apparatus laboring under difficulty. It is my belief that this condition of pruning of circulation is responsible for many changes in both fetus and placenta. Again this glomerular or cotyledonous change is frequently associated with stripping of the branches of some of the large trunks prior to their submergence into the body of the placenta, showing that it is not a degeneration of terminal branches in villi but a widespread vascular change. There is no evidence of vascularization of membranes in these mature specimens. This vascular degeneration seemingly plays considerable part in infarct formation.

3. In widespread infarction, retroplacental hemorrhage and indeed in all cases where fetal injury or death has resulted from placental

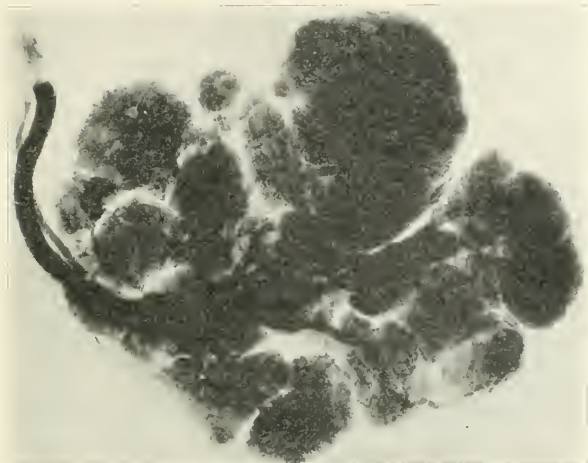


Fig. 11.—Venous injection of a healthy placenta at term. The shrinkage of the cotyledons is clearly manifest.

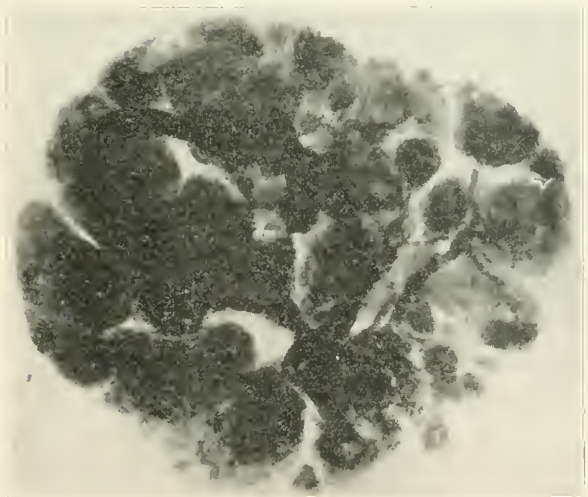


Fig. 12.—Venous injection of a healthy placenta with some peripheral infarction. All gradations, from a healthy cotyledon to one devoid of circulation are to be seen in this specimen.

disease, the changes in the vascular tree are numerous and somewhat remarkable, a change from ordinary senescence to striking vascular degeneration often resulting in deviation of the circulation from large areas, with associated tissue degeneration.

All gradation of degenerative changes are visible in these diseased placentae from those of widespread degeneration to complete destruction of the vascular tree, all stages in the dismantling of the cotyledonous circulation are represented, from a moderate reduction in size with perfect preservation of outline of cotyledon, through stages of very definite reduction in size to those where it is scarcely possible to demonstrate a circulation. The vessels lose their tortuosity, are devoid of fine branches, and show a widespread coarseness which is visible even in the finer ramifications. Functionally dead areas, where no vascular system is demonstrable, are found scattered between these cotyledons; these are the blind spots.

Stereoscopically the placental thickness is shown to be variable, and the organ appears thinner in places, where the vascular degeneration has caused flattening of a segment. It is remarkable how frequently large areas are thrown out of service by these changes. In advanced conditions associated with intrauterine death the only vestige often of a circulation still existant is in the large subamniotic trunks.

From these investigations one must conclude that the placenta, like other organs, is possessed of a youth, a maturity, and an old age. In the young organ the conspicuous anatomic features are:

1. The orderly arrangement of the vascular tree from the distribution of the main vessels on the fetal surface to their ultimate destination in the cotyledonous areas.

2. The directness of the arterial and venous supply of the cotyledons.

3. The rapid reduction in bore of the large vessels only following submergence into the cotyledonous stems.

4. The abundant lateral anastomoses shown by injection, also by rapid return of fluid injected into one artery with return through the other.

5. The short capillary bed shown by rapid return of saline through vein when injected by artery, serial sections, and by the fact that it is possible to push over the injection mass from artery into vein.

A physiologic senescence is conspicuous in and responsible for many structural changes in the old placenta. This is visible in:

1. Beading and straightening of the subamniotic vessels.

2. The stripping of large trunks of their finer branches.

3. Blind spots in the body of the placenta.

4. Lack of compensatory circulation through diminution of anastomotic network.

5. Marked shrinkage of the cotyledonous circulation with ultimate infarction and cessation of function in some areas.

These observations are in harmony with the work of Williams, Eden, Ackerman and others.

The lack of any material circulation in the white infarcted areas, the presence of physiologic degeneration early as shown in passing of the chorionic lobe, the presence of degenerated vessels in fairly healthy villi and the difficulty of pushing over injection mass from artery to vein in old placenta, suggests primary degeneration which may often result in infarction of considerable areas.

In widespread infarction, retroplacental hemorrhage and other conditions where fetal injury has resulted, the degenerative changes in the placental circulation vary from marked vascular degeneration with deviation of circulation from large areas of the placenta to complete destruction of the finer circulation, and usually total loss of function.

There is thus a close relationship between the healthy and diseased placenta, and one ventures to suggest that the ordinary senescence of the mature placenta renders the organ very susceptible to disease processes. The changes in the placenta of growth, maturity, and decay follow each other with great rapidity, and to some extent overlap. After all the life span of the placenta is 280 days, and it is not unusual that the change from the normal to the pathologic should be rapid and often imperceptible.

REFERENCES

- Gross*: Blood Supply of Heart. (Hoeber.) *Ackermann*: Arch. f. path. Anat., 1884, xvi, 439-452. *Eden*: Jour. Path. and Bact., 1897, v. *Williams, J. W.*: Text Book of Obstetrics. *Oertel*: Jour. Med. Research, July, 1918, xxxviii, 3.

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(For discussion see p. 743.)

BLOOD PRESSURE CHANGES FOLLOWING DELIVERY*

BY O. H. SCHWARZ, M.D., ST. LOUIS, MISSOURI

(From the Department of Obstetrics, Washington University School of Medicine.)

A SUDDEN drop in blood pressure following delivery was first brought to my attention in 1915 while attending the labor of a patient with a nephritic toxemia, who had pressure of 190/110. In this case, about thirty minutes after delivery the patient developed a cyanosis, became faint, her respirations were shallow and increased and her pulse was imperceptible. After stimulation, with 2 c.c. of pituitrin intramuscularly, raising of the foot of the bed, the application of a tight binder and weight to the abdomen and wrapping the patient up, all of which took some ten minutes, her blood pressure was taken and patient was found to have a systolic pressure of 70 mm. Hg. She recovered rapidly, and in forty-five minutes was in excellent condition.

Since this time I have made similar observations not infrequently, and I soon appreciated that these drops occurred almost invariably in cases of marked toxemia. In going over the records in Barnes Hospital during the last few years, we were able to pick out several cases whose blood pressure charts were detailed enough to demonstrate these changes quite advantageously. Although the cases included in this paper number ten, we feel that this is no index of its incidence because in many instances no blood pressure readings were made for several hours after delivery.

Since 1912 in our hospital service there have been only sixty-eight cases of toxemia of pregnancy with blood pressures of over 150, and because of the frequency with which we have been seeing these drops recently, we feel that they probably occur in the majority of cases.

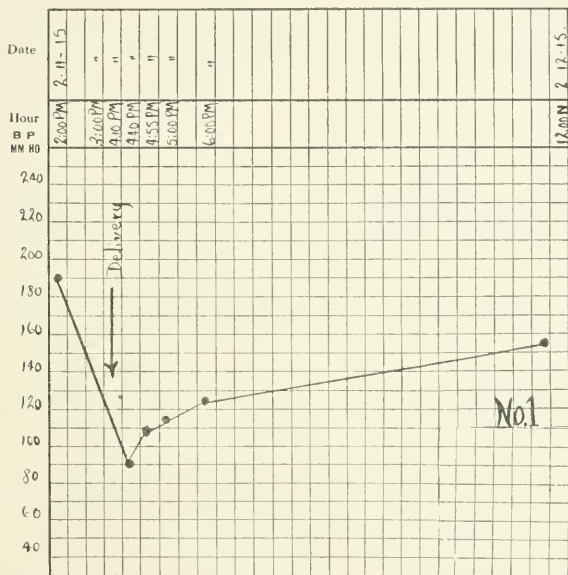
In studying the histories of these cases, there was present in every instance, severe toxemia, and rapid delivery, a method to which I do not subscribe, was carried out in several instances. It is however, quite apparent that rapid delivery is by no means alone accountable for the drop, as it occurred in just as great degree in several of the cases which were delivered spontaneously, or following easy deliveries.

In consulting our text books, Williams' and De Lee's, we were able to obtain some information on this subject. Under the title of "shock," Williams points out that death from this cause has been mentioned, due to the exhaustion from long and hard labor. He

*Read by invitation, at the Forty-eighth Annual Meeting of the American Gynecological Society, Hot Springs, Va., May 21-23, 1923.

feels that this diagnosis is loosely used and that a well conducted autopsy will usually reveal sufficient cause of death. Under "syncope" he describes serious cases with the patient in profound prostration, with recovery the rule. He apparently does not associate these cases with toxemia or hemorrhage.

De Lee, in describing syncope, states that he has seen two cases of almost fatal syncope in cases of acute uremia and toxemia of pregnancy. He mentions that Zweifel reported a case at autopsy and that Norris reported another. Norris' case, however, died four



days after delivery; death was undoubtedly due to a coincident myocardial lesion. De Lee also, in considering the treatment of eclampsia, states that shock not infrequently follows delivery, and mentions Bailey as particularly emphasizing this point. To my knowledge, Bailey's article "Shock in Eclampsia," which has recently been referred to by Kosmak in his monograph, is the only article that has come to my attention, which treats with any detail this particular subject.

In his article Bailey reports six cases in which marked drops in blood pressure occurred, chiefly due to the use of veratrum viride. but his Case 3 shows a drop in a period of one and a half hours

TABLE I

NO.	AGE	DATE OF ADMIS- SION	DATE OF DELIVERY	DURATION OF PREG- NANCY	GRAVIDA	DIAGNOSIS	DURATION OF LABOR	CHARACTER OF DELIVERY
1	33	Outside Case.	Feb. 11, 1915.	40 weeks	V.	Nephritic Toxemia	4½ hrs.	F o r c e p s Perineal
2	34	Jan. 11, 1921.	Jan. 11, 1921.	34 weeks	IV.	Nephritic Toxemia	N o t i n Labor	Manual and Bossi dila- tation. High forceps
3	36	Mar. 8, 1918.	Mar. 13, 1918.	40 weeks	VI.	Nephritic Toxemia	26 hrs.	Spontaneous
4	23	June 26, 1918.	June 28, 1918.	37 weeks	I.	Eclampsia	N o t i n Labor	Manual and Bossi dila- tation. High forceps
5	28	Oct. 21, 1922.	Oct. 24, 1922.	40 weeks	V.	Nephritic Toxemia	28 hrs.	Induct i o n Voor h e e s bag Version
6	28	Aug. 1, 1921.	Nov. 11, 1921.	37 weeks	IV.	Nephritic Toxemia	Short. " Not aware of labor til second stage. ½ hr.	Spontaneous
7		Mar. 9, 1919.	Mar. 19, 1919.	35 weeks	I.	Eclampsia	N o t i n Labor.	Vaginal hys- terectomy Forceps
8	29	Aug. 4, 1922.	Aug. 23, 1922.	39 weeks	II.	Nephritic Toxemia	6½ hrs.	Induction of labor. Oil and pitui- trin. Easy low forceps delivery

TABLE I

SCOPOLAMINE MORPHINE	ANESTHESIA	ALBUMIN N.P.N.	CONDITION OF CHILD	CONDITION OF MOTHER	HEMOR- RHAGE	AUTOPSY FINDINGS
None	Ether at delivery	Alb. $\frac{1}{2}$ gm. per lit. No casts	Living	Recovery	None	
1 injection Gr. 1/133 Morphia 1/6	Ether for delivery	Alb. 40 gm. per lit. Granular casts	Living	Death three hours after delivery	Slight bleeding one hour after de- livery	No Autopsy
3 injections Gr. 1/133 1 injection Gr. 1/300 2 injections Gr. 1/200 4 injections Gr. 1/400	Ether for delivery	Alb. 9 gm. per lit. Granular casts	Living	Death	None	Normal post- partum uterus. No uter- ine in- jury. Chronic diffuse nephritis
None	Ether at delivery	Alb. 17 gm. per lit. Many gran- ular & Hya- line casts	Living	Recovery	None	
None	Nitrous ox- ide with small amount ether at de- livery	Alb. +++ No casts N.P.N. 20 mg.	Living	Recovery	None	
None	None	Alb. 4 gm. per lit. Granular casts N.P.N. 39 mg.	Living	Recovery	None	
None	Ether at operation	Alb. $\frac{1}{2}$ gm. Granular hyaline casts	Living	Recovery	None	
Scopolamine over 9 hrs. 4 injections 1/133 2 injections 1/266	Ether at delivery	Alb. 5 gm. N.P.N. 43 mg.	Living	Death two hours after delivery	None	Acute tubular nephritis. Liver focal necrosis, periph- eral subendo- cardial hemor- rhage. No uter- ine in- jury

TABLE I—CONT'D.

NO.	AGE	DATE OF ADMIS- SION	DATE OF DELIVERY	DURATION OF PREG- NANCY	GRAVIDA	DIAGNOSIS	DURATION OF LABOR	CHARACTER OF DELIVERY
9	24	Oct. 29, 1920.	Oct. 29, 1920.	32 weeks	I.	Eclampsia	7 $\frac{3}{4}$ hrs.	Manual and Bossi Dila- tation. Midforceps
10	21	May 13, 1923.	May 13, 1923.	36 weeks	I.	Eclampsia	21 hrs.	Induct i o n Voor h e e s bag. Low forceps
11	40	Mar. 29, 1923.	Mar. 31, 1923.	37 weeks	XIII.	Hydram- nois over 10,000 c.c.	13 $\frac{1}{4}$ hrs.	Spontaneous
12	31	May 14, 1923.	May 16, 1923.	37 weeks	IX.	Twin Pregnancy McDonald 44	7 hrs.	Induct i o n Voor h e e s Bag. Pres- sure symp- toms. Ver- sion. Twins
13	21	Oct. 22, 1922.	Oct. 23, 1922.	36 weeks	II.	Chronic Inter- stitial Nephritis	3 $\frac{1}{2}$ hrs.	Sp. ntaneous

after the delivery of twins in which no veratrum viride had been used, with a prompt rise in blood pressure following. In his paper Bailey came to the following conclusions:

1. Rapid emptying of the uterus in eclampsia frequently produces a decrease in blood pressure amounting to 100 mm. Hg., causing a condition of collapse or shock.

2. Veratrum viride given to its full physiologic effect may cause a drop of 145 mm. Hg. in the blood pressure, producing shock.

3. The administration of veratrum viride combined with emptying of the uterus in eclampsia may produce such profound shock that the patient cannot recover.

4. While it is probable that the high blood pressure of eclampsia is one of Nature's protective mechanisms, still if it is deemed advisable to lower it, nitroglycerin and erythol tetranitrate should be used, for their action is on the peripheral vessels and not on the medullary centers.

5. One of the best means of temporarily lowering the blood pressure in antepartum or intrapartum eclampsia is the emptying of the uterus.

Further, MacGlannan in discussing blood pressure changes during abdominal operations, points out that during cesarean section there was no marked drop in blood pressure; whereas, if the section was

TABLE I—CONT'D.

SCOPOLAMINE MORPHINE	ANESTHESIA	ALBUMIN N.P.N.	CONDITION OF CHILD	CONDITION OF MOTHER	HEMOR- RHAGE	AUTOPSY FINDINGS
5 injections over 7 hrs. 3 injections Gr. 1/133 2 injections Gr. 1/200	Ether at delivery	Alb. +++++ Hyaline Granular casts	Stillborn	Recovery	None	
None	Nitrous oxide at delivery		Living	Recovery	None	
None	None	Albumin trace	Living	Recovery	None	
None	ChCl ₃ at delivery	No albumin	Twins Living Wt. 2410 “ 2910	Recovery	None	
None	Nitrous oxide at delivery	Alb. 1½ gm. per lit. Hyaline, finely and coarsely granular N.P.N. 29.4 mg.	Living	Recovery	None	

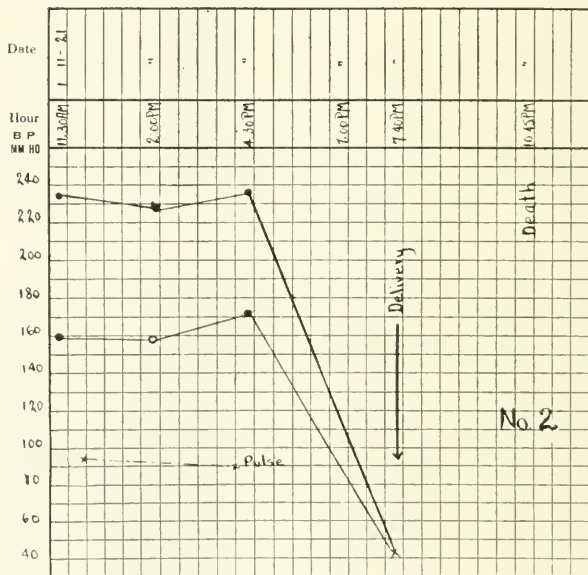
done in a case of eclampsia the fall in pressure, as the uterus was emptied, was a great one, and illustrates this in a case which dropped from 160 to 70 over a period of forty minutes.

In the cases that we have observed with marked drop in blood pressure following delivery, we have been impressed with the fact that these occur in some cases almost immediately after delivery. Mindful of this fact, we thought it would be of interest to study in this connection a series of more or less normal cases. Accordingly, eighty cases were studied, and it was noticed that during labor in many instances there is a rise in blood pressure toward the end amounting to 10 to 20 mm. Hg., and occasionally somewhat higher. A slight drop of 10 to 20 mm. Hg., usually follows in the first ten minutes after delivery. In cases in which there was slight hypertension (140-150) the drop was somewhat greater, not infrequently as much as 40 mm. Hg., but with no unusual symptoms and a prompt rise following.

These observations coincided with the observations of Bailey and others in normal cases. In two occasions there were drops of over 50 mm. Hg., but in one case there was a slight postpartum hemorrhage and the other also followed a hemorrhage associated with the manual removal of a retained placenta an hour and a half after delivery. It may be stated that in this series perhaps half of the patients re-

ceived scopolamine, and at the beginning of the third stage they received 1 c.c. of pituitrin, and also 1 c.c. of ernutin at the end of the third stage.

Two cases recently observed are of particular interest. One was a case of hydramnios in which there was over 10,000 c.c. of amniotic fluid, with the patient abnormally distended, and which showed a comparatively small drop after delivery and no evidence of either syncope or shock. Another case, just delivered showed a markedly distended uterus from a double ovum twin pregnancy. Both fetuses were fairly large, 2410

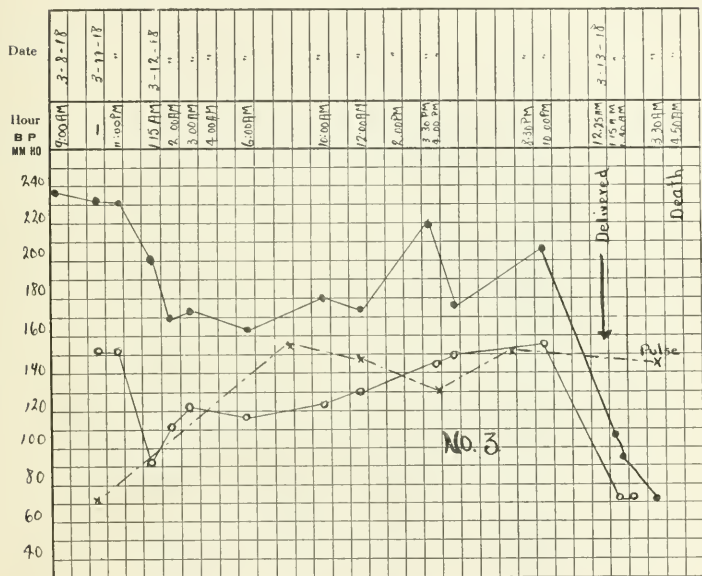


and 2910 gm. respectively, with a slight hydramnios in one amniotic cavity. This case showed practically no drop following the delivery of either child, and only a slight one after the expulsion of the placenta. These cases serve to demonstrate that factors other than the sudden emptying of the overdistended uterus are necessary and, perhaps, even more important.

It appears from my experience that the multiparous patients who have a chronic nephritic process ordinarily, and who develop an exacerbation of this condition during pregnancy, are most apt to show the largest drops; although so-called preeclamptic and eclamptic

primiparous patients show the drop quite as well. As previously mentioned, in some instances this fall has been observed to occur as early as two minutes following delivery to its fullest extent, while in others it has occurred to its fullest extent sometimes as late as two hours after delivery. These drops are frequently as great as 100 mm. Hg., and if the pressure does not rise in a comparatively short period of time the condition is serious and may even lead to death.

That the condition is best described as a syncope immediately after delivery is, perhaps, the most logical. In some instances if proper measures are instituted the patient immediately recovers. In other

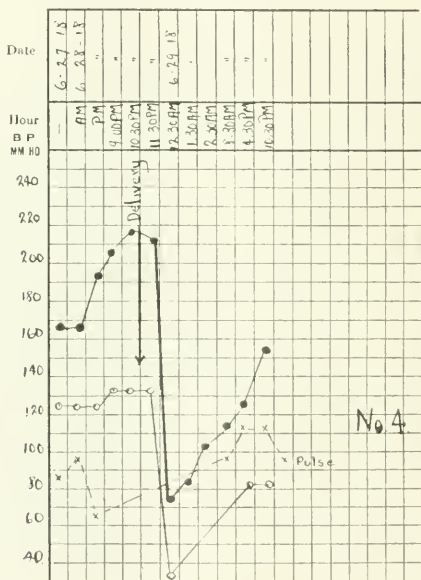


instances this syncope may lead to a condition analogous to shock, and the response to stimulation become less effective; further, the patient, if neglected, may go into definite shock and death may follow it in spite of all stimulation.

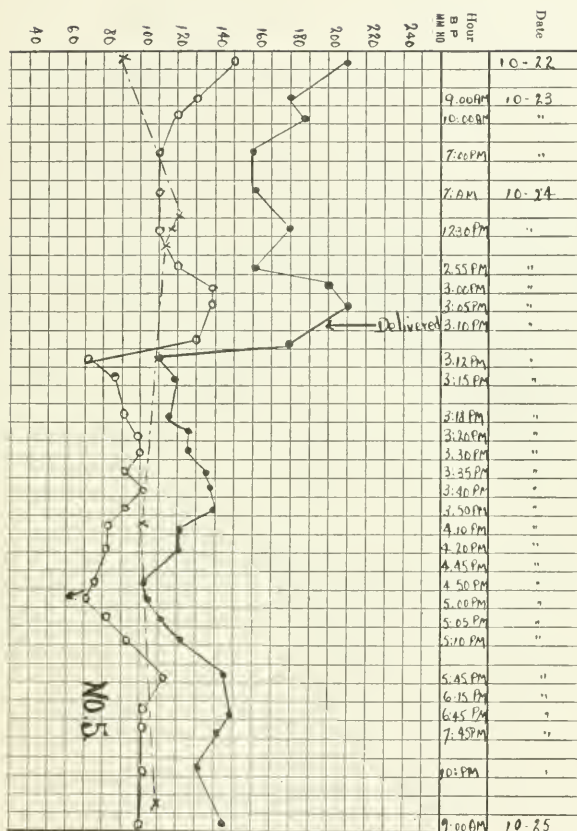
The question as to what these drops are actually due is perhaps not so easy to explain. Judging from the study of the normal series, and even in cases of great distention of the abdominal wall, if these cases are properly handled in the absence of hemorrhage, there seems to be present a mechanism which prevents a dilatation of the splanchnic

area in spite of the sudden change in abdominal pressure and the marked laxity of the abdominal wall.

The old experiments of Leonard Hill may be properly mentioned at this point. These concern so-called gravity shock. They are described by Macleod in the following manner: Gravity shock is caused by the stagnation of blood in the splanchnic vessels and a consequent inadequate filling of the heart in diastole. It occurs, when the erect position is assumed, in animals in which the mechanism, which ordinarily compensates for the tendency of gravity to make the blood flow to the dependent parts, is inadequate. Thus, when a domesticated rabbit with a large pendulous abdomen is held in the

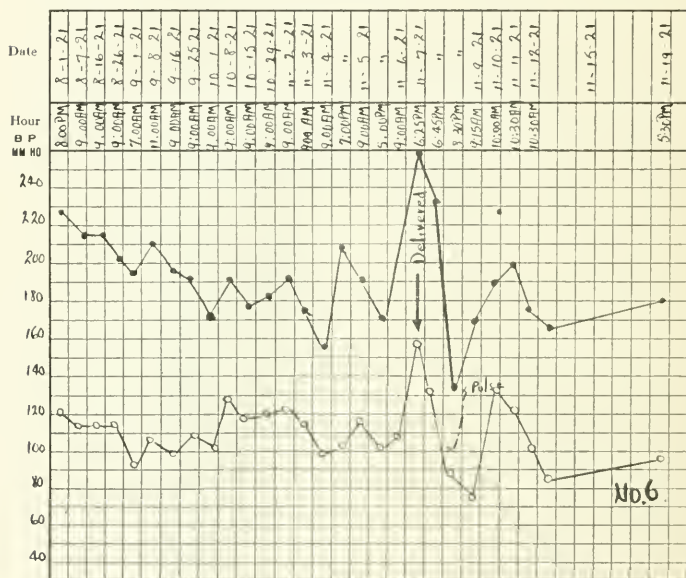


vertical tail down position for any length of time, the animal gradually passes into a shocked condition and may die in a short time (20 to 30 min.). Observation of the blood vessels of the ear or a record of arterial blood pressure will show that the cause of shock in this case has been a great curtailment of the blood supply to the upper part of the body, and therefore to the nerve centers. The shock is entirely dependent upon the laxity of the abdominal musculature, for if a binder is applied to the abdomen, or if the experiment is performed on a rabbit whose abdominal musculature is in good condition, gravity



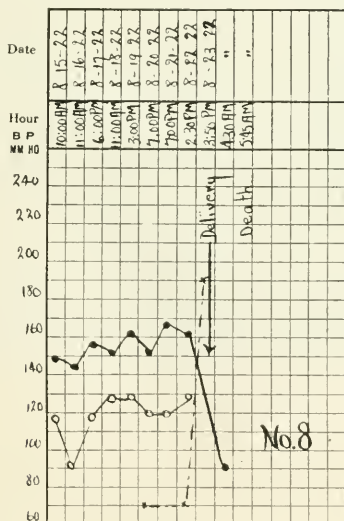
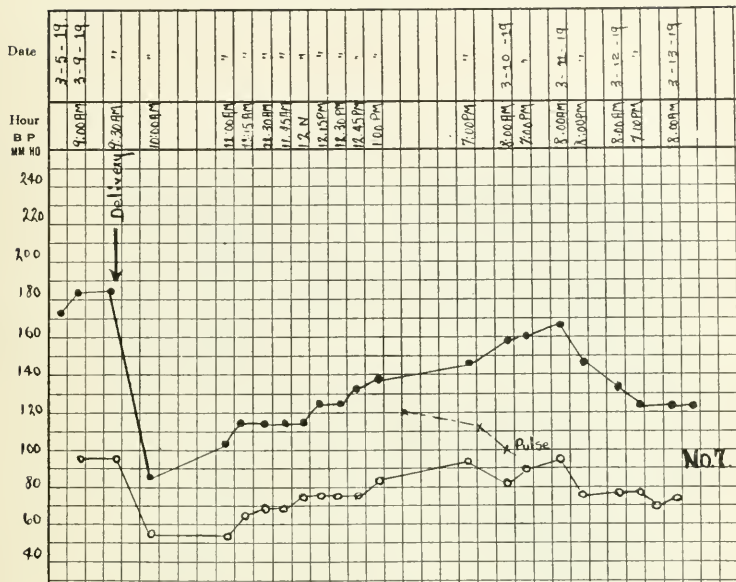
shock does not develop. Nor can fatal shock be produced in a dog, although in a deeply anesthetized animal a marked fall in arterial blood pressure occurs when the vertical tail down position is assumed. In man, in whom compensation for the erect posture is highly developed, shock from gravity occurs only when there has been some other considerable upset in the circulatory mechanism.

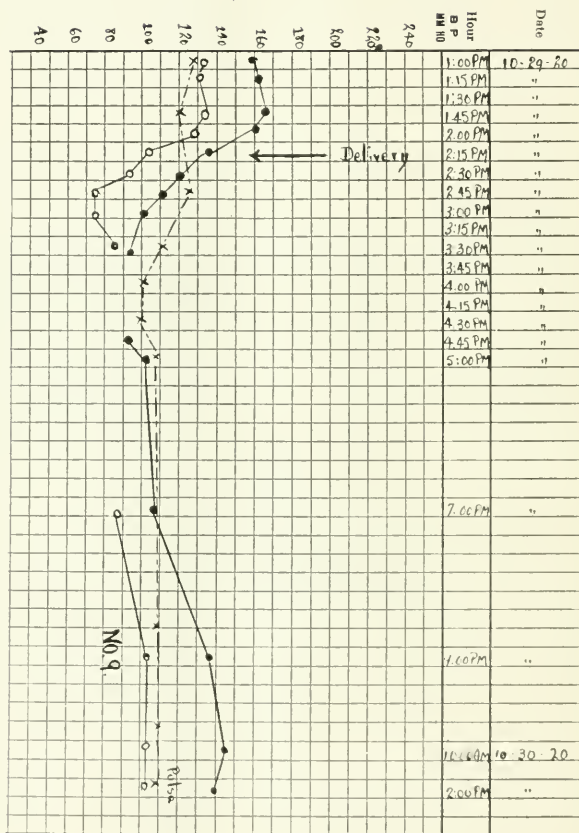
As previously mentioned, in cases of normal pregnancy the vasomotor mechanism is sufficient to take care of the sudden emptying of the uterus and the relaxation of the abdominal wall. In cases of toxemia, however, due to an already strained vasomotor mechanism,

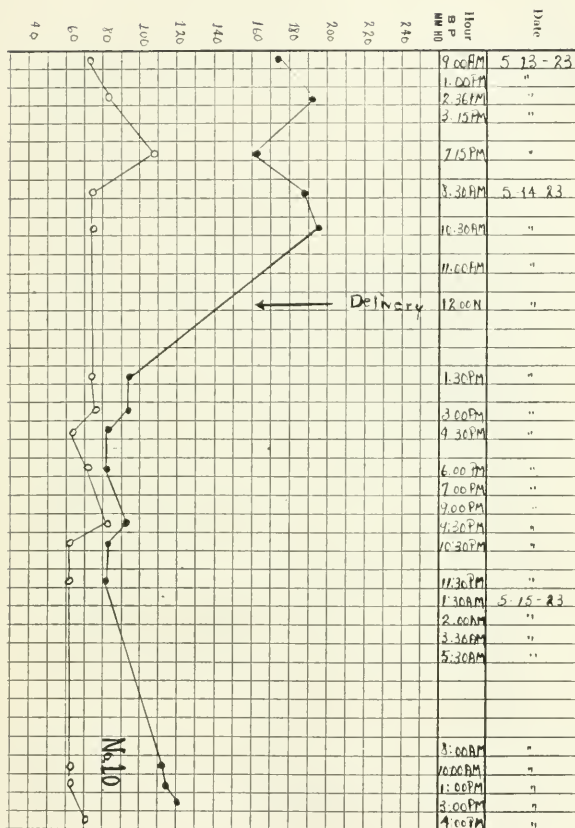


perhaps chiefly influenced by the presence of toxic substances, compensation does not take place and there results a great splanchnic dilatation with insufficient amount of filling of the heart during diastole. If this condition is not anticipated and efforts made immediately to combat it, a more permanent condition develops which is more resistant to stimulation.

Although in normal cases the physiologic hemorrhage of the third stage, the delivery, either spontaneous or operative, the anesthesia and the rapid emptying of the uterus with the relaxed abdominal wall are attended with no unusual symptoms, these factors in markedly

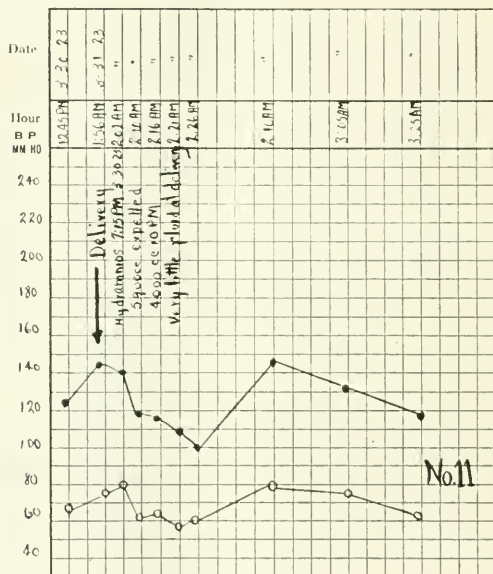




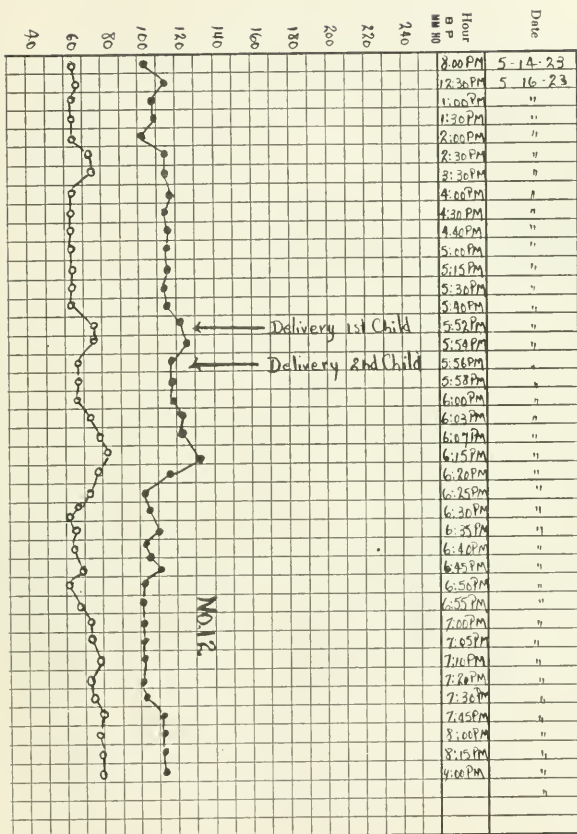


toxic cases may act in an accumulative way to bring out this condition, which may be termed shock.

It will be noted that the cases included in this series received comparatively little drugging before delivery. No chloral or veratrum viride was used. Scopolamine was used rather freely in three or four cases, but can hardly be accounted responsible for these drops except as part of an accumulation of causes, particularly since there was no difference in the normal cases, whether scopolamine was or was not used. Magnesium sulphate was used in one case by Dr. Dorsett.

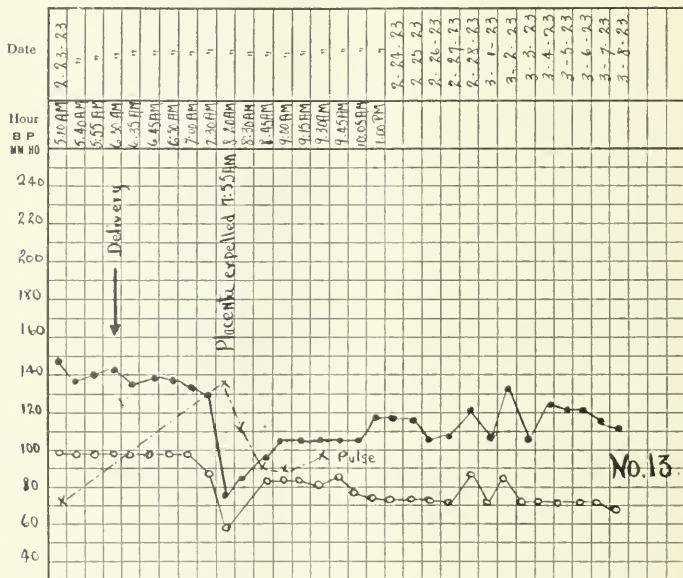


Whatever the actual cause or causes of this rather sudden drop with the varying symptoms may be, it is a condition which should be anticipated as possible after every delivery in cases of severe toxemia. In attending these patients efforts should be made to conserve the patient's strength throughout the period before delivery and at the time of delivery: saline solution subcutaneously, bowel and gastric lavage, should be the chief treatment. Drugs should be used cautiously and only in an accessory way. Veratrum viride should be avoided. If the patient is not in labor, induction should be carried out in a conservative way, with a spontaneous or easy operative delivery following. Immediately following delivery the application of



a tight binder and the placing of sand bags on the abdomen are perhaps the most important; the use of adrenalin, 15 mm., one injection, followed by pituitary extract is to be recommended. Intravenous glucose, possibly transfusion, should not be delayed, and other measures usually employed in shock should, of course, be included.

We agree with Bailey that the treatment of the toxemia is more important than the lowering of the blood pressure, and that the use of veratrum viride before delivery is particularly dangerous, and that the withdrawal of blood is also contraindicated. The fact that the



success of the treatment of eclampsia by the Dublin method stands out so prominently may be due to the fact that they treat the toxemia, and give little or no attention to the lowering of the blood pressure by the use of drugs or venesection.

The condition can be, perhaps, best studied by referring to the accompanying table and charts, and therefore I have omitted additional case histories.

REFERENCES

- Bailey, Harold C.: *Am. Jour. Obst.*, 1911, lxiv, 260-270. Kosmak, Geo. W.: *The Toxemias of Pregnancy*, Appleton's Obstetrical & Gynecological Monographs, N. Y., 1921.

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CARCINOMA OF BARTHOLIN'S GLAND*

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PRI-MARY carcinoma of Bartholin's gland is a very rare tumor. A review of the literature reveals not more than twenty cases. August Martin¹ in his book mentions the disease, and cites a case in which the diagnosis was made and recurrence followed removal in four years. In 1887 Geist² reported a case which he describes as part tubular cancer and part scirrhus. Schweizer³ and Mackenrodt⁴ both reported cases in 1893, but failed to give details regarding metastases, type of tumor and final result. These observations were followed by occasional contributions to the subject, most important of which are articles by O. V. Frisch⁵ in 1904 and Sitzenfrey⁶ in 1906. Spencer⁷ in 1913 reviewed the literature and found seventeen cases. He also reported an additional case. In America, Kelly⁸ described one case in 1898, Lynch⁹ mentions a case but does not describe it fully, and Taussig¹⁰ has a doubtful case.

Etiologically the same theories that are advanced for carcinoma in general may be applied to carcinomata arising in this tissue. Chronic inflammation has been present in a considerable number of the reported cases. Indeed, because of the rarity of malignant changes and the frequency of inflammatory reaction here, tumors have frequently been misdiagnosed as abscesses, or have arisen from the gland following an abscess formation. Kelly's case was first incised under the impression that it was an abscess, and several other cases have had a similar history.

The average age of the patients here presented is 52.7 years, the youngest being 29 and the oldest 91 years. The tumors usually develop after the menopause, and this has been cited as a possible cause of the tumor. There was no history of direct trauma in these cases.

Heredity has not been noted in many of the reported cases. Kelly states that the mother of his patient had carcinoma, and our case gave a history of a maternal and paternal uncle having died of carcinoma. The incidence of the various etiologic factors is not easily obtained from a study of the literature; because many of the reports have been extremely fragmentary even in the essential items.

A better understanding of the pathology of this condition can be obtained by a brief review of the histology of the gland. It is a compound acinous gland, the acini being lined by calciform columnar epithelium, and separated from each other by strands of connective

*Read at the Forty-eighth Annual Meeting of the American Gynecological Society, Hot Springs, Va., May 21-23, 1923.

tissue and striped muscle fibers (de Sinety¹¹). The ducts on the other hand, are lined by columnar epithelium in the deeper parts which gradually gives way to two or more layers of transitional cells, and they in turn are replaced by squamous cells as the ducts approach the surface of the vulva. Jambon and Chaboux¹² state that "the excretory ducts appear in the middle of the gland in the form of irregular cavities reaching even to the middle of the acini. They present an epithelium either of one or of several layers of cuboidal cells. The lining becomes thicker as the ducts become larger and more important. The cells are only half the size of the secretory cells of the acini. Near the termination of the duct the superficial layers of the lining membrane tend to become squamous." These authors say nothing about a distinctly cylindrical epithelium of the ducts although it is mentioned by de Sinety, Klein,¹³ Langhans¹⁴ and J. Thomas.¹⁵

Sitzenfrey,⁶ G. Nobles and others have called attention to the fact that, in chronic inflammation of the gland of neisserian origin, the ducts may be lined throughout their entire length by squamous cells instead of the transitional and columnar cells usually found in the deeper portions.

It will be seen, therefore, that there is a possibility of the development of two types of carcinoma in Bartholin's gland: (1) squamous cell tumors, arising from the ducts near the surface in uninfamed glands or in the deeper portions of the ducts in glands which have been the seat of chronic inflammation leading to alteration in their lining membranes; (2) the columnar cell carcinoma, or adenocarcinoma, arising from the gland acini or from the unaltered duct epithelium in their deeper portions. It is possible that carcinoma arising from the columnar cell elements of the gland may, as the tumor develops, come to resemble a squamous cell carcinoma, a phenomenon comparable to that which occurs in the adenocarcinoma of the cervix uteri.

Metastases frequently occur in the inguinal lymphatic glands of the same as well as the opposite side from which the tumor arose. The case described by Lynch died following the development of cerebral metastases. As in all carcinomata of the vulva, recurrence following removal is extremely common. In some patients the periosteum of the rami of the pubes is involved, and, as in our case, the urethra was involved at least in the periglandular inflammatory reaction. Sinus formation is common, and may persist for years before evidence of malignancy is seen. Ulceration of the skin overlying the tumor is very common, as is round cell infiltration of the supporting stroma of the gland.

There is no reported instance of bilateral carcinoma of the gland, although in Sitzenfrey's case there was a chronic inflammation of one of

Bartholin's glands, and carcinoma of the opposite gland at the same time.

The symptoms are swelling of the labium in the region of the gland with an edema of the remnants of the hymen on that side. In many cases this swelling was painless at first, followed in a few months as a rule by tenderness, and an aching drawing sensation. Sometimes there is a severe lancinating pain, which radiates to the coccyx and groin. It is aggravated by walking, or coitus, and is usually worse during the menstrual periods. Local examination reveals the growth as a hard lump, varying in size from a hickory nut to an orange which may be freely movable, or, in the later stages, attached to the surrounding structures and fixed. The skin over the tumor may be thin and bluish, and tends to ulcerate. The mass is frequently tender to touch, and may break down in the center forming a fluctuating mass before ulceration on the surface. The inguinal glands are early invaded, but in some cases their enlargement may be due to secondary infection following ulceration and necrosis of the primary tumor.

The course is usually rapidly downward. The reported cases are very deficient in data regarding the final outcome. Trotta¹⁶ is the only man who reports a six year cure. Eden¹⁷ reports a three year recovery. Many writers content themselves with the notation, "no recurrence in two to six months."

The diagnosis is usually easy when the possibility of the condition is kept in mind, but its extreme rarity has resulted in very few cases being diagnosed before operation. The chief diagnostic points are the age of incidence, usually over fifty, the hardness of the tumor and its tendency to fixation. Pain is very suggestive especially if associated with edema of the vulva and skin over the gland. Metastases to the regional lymph nodes, hard and shotty, and a tendency for the tumor to break down are the important points. The chronicity of the affection, and its failure to respond to ordinary therapeutic measures are also of value. Biopsy in doubtful cases establishes the diagnosis.

It must be differentiated from other carcinomata of the vulva such as epitheliomata arising from the labia or clitoris, and this may be very difficult in cases that have ulcerated when first seen. The history of the point of origin together with the fact that these are purely squamous cell carcinomata which do not involve the ducts is usually sufficient for differentiation. Abscess of Bartholin's gland has frequently been confused with carcinomata. The history of gonorrhea, with positive smears, and involvement of other structures, the acute course and the rapid response to surgical treatment usually make the diagnosis plain. Sarcoma of the gland or labium is a very rare tumor, occurring in younger individuals as a rule, and microscopic section reveals the characteristic mesoblastic cell. Melanotic tumors of this

region are not so very common, and their diagnosis is usually made on the rapid growth and the characteristic pigment production. Fibromata of the vulva are easily excluded by their very slow growth, good encapsulation, and failure to invade surrounding tissue.

The treatment consists in removal as soon as diagnosed, supplemented by radium application and x-ray treatments of the affected area, as well as the opposite side and inguinal region. Excision in early cases is usually easy, but in neglected cases when the pubic arch is involved as well as the vaginal wall a rather extensive dissection has to be carried out. Taussig advises a two step operation in which the regional lymphatics are first removed, using the Bassett technic, which includes the removal of the internal iliac glands, inguinal lymphatics, round ligament and the lymphatics under Poupart's ligament and in Scarpa's triangle. The same procedure is carried out on the opposite side. Two weeks later the tumor is removed by the cautery knife and the wound thus produced allowed to heal by granulation, treated by the open air method and Dakin's solution.

We have used local applications of radium and x-ray in the manner to be described in the following case.

The tumor occurred in a patient aged thirty-eight who applied for treatment on Feb. 15, 1922. She was an American, white, divorced for seven years, occupation housework; she had had two miscarriages, first at six months in 1914, with uneventful recovery; her menses began at seventeen, were regular, no dysmenorrhea, moderate in amount and lasted three to four days; her last period was Feb. 1, 1922. She denied nycturia, frequency, smarting or burning for the past two years; she had had no operations. The present illness began after the patient had been married a few days. Her husband had been a saloon keeper and considerable of a roué. She noted some discharge and pain and burning on urination. Her husband twice caused her to abort by kicking her in the abdomen and beating her. She is under the impression that during one of these attacks she was injured in the region of the left labia. About two years ago the patient first noticed some swelling of the left labia which gradually grew to the size of a large orange. She denied discharge from this swelling and stated that she could manipulate it and walk without pain. In October, 1921, she consulted a doctor who gave her potassium iodide for the tumor. The mass persisted and so she consulted another doctor who gave her some salve to apply. A few days later the tumor began to discharge a watery pus and decreased somewhat in size. For the previous months before entering the clinic she had no discharge and the tumor on entry was the size of a lemon and gave her very little pain or discomfort. There was nothing of importance in her past medical history. The family history showed her father and mother to be alive and well at the age of sixty two; she had three brothers and two sisters alive and well; the grandparents had no history of carcinoma. One maternal and one paternal uncle had carcinoma.

Physical examination: Patient was a well developed, well nourished, white female; teeth in poor condition; no enlarged cervical glands; breasts were negative; lungs clear throughout on percussion and auscultation; vocal and tactile fremitus normal; heart well within normal limits; no thrills, shocks or murmurs. The abdomen showed no definite localized areas of tenderness; solid organs not palpable; no visible or palpable tumor masses. Vaginal examination revealed a slight amount

of greenish pus between the labia; no cutaneous irritation. The left labium majus bulged over the introitus, due to a mass the size of a lemon which seemed to arise in the region of Bartholin's gland. It was hard, fluctuated slightly, rather movable and was smooth everywhere except on its vaginal aspect, where it was rough and nodular like a carcinoma. This roughened area presented numerous small white ulcers varying in size from 5 to 25 mm. which bled quite readily. The entire mass was very tender and the skin over it was somewhat bluish and edematous. The right labium was negative. Pus could be expressed from the urethra. Smears from the same were negative for gonococci. The cervix was small and conical; uterus freely movable and in good position; adnexa were not palpable. The left chain of inguinal glands were enlarged and hard, the largest being the size of a

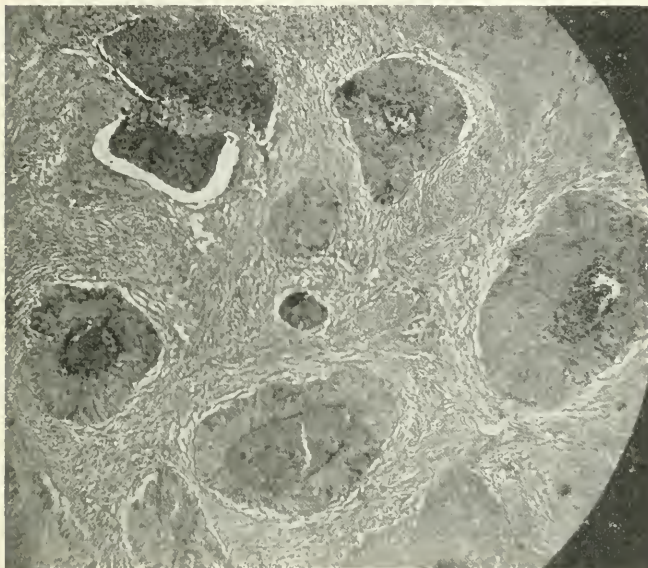


Fig. 1.—Carcinomatous degeneration of the epithelium of the ducts of the gland giving rise to squamous cell carcinomatous infiltration.

hickory nut. The blood count: Hb. 95 per cent; RBC 4,620,000; WBC 11,000; Blood pressure 135/80. Wassermann 4+ to both antigens.

The preoperative diagnosis of chronic granuloma, possible carcinoma, was made. Operation was performed on March 3, 1922. The tumor was found to be adherent to the levator ani in its lower pole, and to extend to the ramus of the pubis laterally. The dissection was carried as wide as possible, and a small piece of the urethra was accidentally removed with the upper pole. Recovery was uneventful, and the pathologic report is here given.

Gross description: The specimen is an oval mass of 6×3×2 cms. The surface is irregular in outline and slightly hemorrhagic. It is firm in consistency. The cut surface is light in color, moist, and granular, with no evidence of necrosis. On

setaping across the cut surface a fluid containing small granules resembling cancer juice is seen.

Microscopic description: Section of the tissue shows a rapidly growing carcinoma invading the entire depth of the tissue received. The carcinoma tends to be medullary in type and in places appears to be growing in the lymphatics. The tumor tissue shows considerable tendency to grow as pseudostratified epithelium, with occasional epithelial pearls. In places it appears very much like epithelium lining ducts. It probably arose from duct epithelium. In another region adenocarcinoma cells can be seen forming a typical acini as they invade the gland stroma.

Diagnosis: Carcinoma of Bartholin's gland.

Immediately upon determination of the malignancy of the tumor we placed 25 mg. of radium into the wound and 25 mg. over the left inguinal region, making a

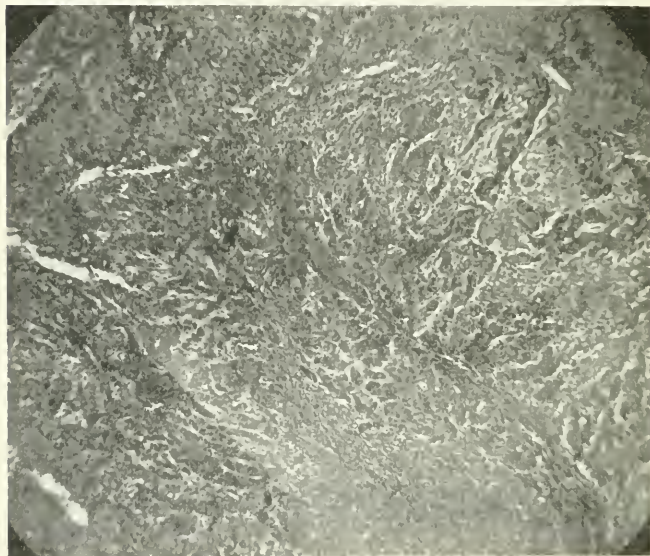


Fig. 2.—Carcinomatous degeneration of the epithelium of the acini of the gland giving rise to adenocarcinomatous infiltration.

total application of 625 mgr. One week later we repeated the application, this time using 750 mgr. or a total of 1375 mgr. for both treatments. This was followed by 10 x-ray treatments. The wound healed nicely and the patient was discharged on March 29, 1922, after having had salvarsan and grey oil injections.

She returned on May 2, 1922, with a history that there had been considerable reaction at the site of application of the radium, which, however, had disappeared at this time. Because of this history of reaction she was given only 250 mgr. of radium over the left inguinal region and no x-ray treatments. She also received further antiluetic treatment and was discharged on the 27th. There was no evidence of recurrence, either local or metastatic at this time.

She reentered the hospital July 27th and stated that since she left the hospital

TABLE I

AUTHOR AND CASE	AGE	INFLAMMATION	OPERATION	TYPE	METASTASIS	RESULT
1. Kelly	55	None	Incised, 4 months later excised.	Adeno-Carcinoma		
2. Eden	40	Abscess with Sinus	Removal with inguinal glands and part of pubic arch, radium	Adeno-Carcinoma	Inguinal glands	No recurrence in three years.
3. Spencer	43		Excision with both inguinal chains.	Adeno-Carcinoma	None	No recurrence in 22 months.
4. Lynch	43	None	Removal with inguinal and vaginal metastases	Squamous	Right inguinal and cerebral	Death 2½ years later.
5. Martin	70	None	Removal with inguinal glands		Inguinal glands	Recurrence in 4 years
6. Geist	59	None	Removal	Adeno-Carcinoma	None	
7. Schweitzer	58	Diagnosed inflammatory 3 years.	Refused	Carcinoma parvi cellular	None	
8. Mackenrodt	54	None	Removal		None	No recurrence in four months.
9. Honan ¹⁹	40	Discharging sinus 1 year.	Removal		Opposite inguinal 1 year later	No recurrence in two months.
10. Godart ²⁰	45	None		Chaneroid	None	
11. Trotta	30	None	Removal	Carcinoma	None	No recurrence in six years.
12. R. Schaffer ²¹	73	Considered abscess 4 years.	Removal	Adeno-Carcinoma	Inguinal glands	Recurrence in two years
13. Burghelle ²²	50	Fistulae		Adeno-Carcinoma		Recurrence in 1 month. 2nd removal.
14. O. V. Frisch	77	Discharging sinuses	Removal—local anesthetic	Adeno-Carcinoma	Inguinal	
15. A. Sittenfrey	29	Bilateral inflammation of gland	Removal—Thermocautery	Adeno-Carcinoma	None	Recurrence in scar 6 months. 2nd removal.
16. Pape ²³	91	None	Removal	Adeno-Carcinoma	None	
17. Falls	39	Ge and Ines	Removal left inguinals, radium	Adeno-Carcinoma	None	No recurrence in 14 months.

she had had no discharge, pain or tenderness and was in the best of health. She had been up and around working all of the time; there had been no bladder or rectal disturbances. The only change noted was that she had not menstruated since April, had hot flashes and other symptoms of an early menopause. The physical examination was absolutely negative as far as recurrence in the labium was concerned and the inguinal glands were not larger than normal. The blood examination at this time revealed RBC 4,295,000; WBC 8,700; Hg 83 per cent and normal differential count. At this time, as a prophylactic measure, an extensive dissection of the inguinal glands was made, and the lymphatics of the upper portion of the left labium and the round ligament were also removed. Nothing resembling carcinoma was seen at this time and the wound healed by first intention.

She reentered the hospital on Nov. 1, 1922, for continuation of her antituberc treatment and for a radium burn in the left inguinal region about the size of a dollar. This burn healed slowly under treatment by moist dressings followed by balsam of Peru. There was no evidence of metastases at this time and her general condition was very good.

It has now been approximately fourteen months since the operation and there is no evidence of recurrence. We, of course, realize that it is too early to speak of cure in this connection.

The rarity of this tumor together with the paucity of literature, especially American, on this subject has prompted the writer to present this subject before this society.

BIBLIOGRAPHY

- (1) *Martin, A.*: Diseases of Women. (2) *Geist*: Inaugural Dissertation, Marburg, 1880. (3) *Schweizer*: Arch. f. Gyn., 1893, xlv, 322. (4) *Mackenrodt*: Ztschr. f. Gyn., 1893, xxvi, 186. (5) *Frisch, O. F.*: Monatsschr. f. Geburtsh. u. Gynäk., 1904, xix, 60. (6) *Sitzenfrey, A.*: Zentralbl. f. Geburtsh. u. Gynäk., 1906, lviii, 263. (7) *Spencer, H.*: Proc. Royal Soc., 1913-14, vii, part II, 102. (8) *Kelly, H.*: Operative Gynecology, 1907, 257. (9) *Lynch, F. W.*: Pelvic Neoplasms, 1922, 32. (10) *Taussig*: Am. Jour. Obs., 1917, lxxvi, 794. (11) *de Sinety*: Comp. rend. Soc. de biol., 1880, 7 ser, ii, 280. (12) *Jambon and Chabouze*: Lyon Med., 1906, cvii, 3. (13) *Klein*: Stricker 2 Handbuch der Lehre von der Geweben, Leipz., 1871-72, 648. (14) *Langerhans*: Virchows Arch. f. path. Anat., 1874, lxi, 208. (15) *Thomas, J.*: Inaugural Dissertation, Marburg, 1880. (16) *Trotta*: Arch. di Ost. e Gin., 1900, 193. (17) *Eden*: Proc. Royal Soc., 1913-14, vii, part II, 102. (18) *Sinn, W.*: Inaugural Dissertation, Marburg, 1880. (19) *Honan, J. H.*: Inaugural Dissertation, Berlin, 1897. (20) *Godart*: Bull. Soc. Belge de Gynec., 1899, ix, 109. (21) *Schaffer, R.*: Ztschr. f. Geburtsh. u. Gynäk., 1903, 1, 193. (22) *Burghelle, W. N.*: Zeitschr. f. Geb. u. Gyn., 1903, 1, 1102. (23) *Pape*: Deutsch. Med. Wehnschr., 1907, xxxiii, 1620.

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(For discussion see p. 749.)

PYELITIS OF PREGNANCY*

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IN reviewing the literature before approaching this important complication of pregnancy it would seem that great stress has been laid by investigators upon finding a specific factor upon which might be placed the entire blame for its causation. But not all those whose enthusiasm has led them in their investigation and research have fully taken into consideration the kidneys and their important rôle during gestation and pregnancy itself. The former can well be considered as first, for notwithstanding the many changes that occur in pregnant women's organs and tissue, most of the investigators have relied solely in their research upon the kidney tract and its function, unassociated with the other organs and tissue, to bring out a positive proof, failing entirely to associate the anatomic changes that occur in other organs of the individual during pregnancy. It is upon the kidney that falls one, if not the most important, rôle during the many months preceding and following childbirth. If we consider the pregnant individual's systems separately, setting aside the particular organs of gestation temporarily, the order in which the health of the individual depends we can readily place as follows: the digestive tract and organs associated with the same, and the urinary system, including the kidneys, ureters and bladder. These with the vascular system are, without doubt, the three leading systems in the order named, playing their major parts and each dependent upon the other in true accord and balance. Each can and will produce at times distinct and serious complications which in turn involve the other two. But of the three, the urinary system, if pathologic changes begin, leads to the gravest and most serious complications for both the individual and offspring during the antenatal and postnatal states. It might be well to consider that pyelitis in nonpregnant women is comparatively infrequent as a complication or sequel following other febrile disease, while in pregnancy, on the other hand, it is by no means an infrequent complication.

The study of this condition complicating pregnancy was begun with a very definite point of view, namely, that a distinct and separate cause or associated causes in each instance could be located by means of a thorough routine procedure. All patients underwent the same course of study, developed the disease between the third and eighth month of gestation and were cared for in institutions where every facility was available for a thorough clinical and laboratory investigation.

*Read by invitation at the Forty-eighth Annual Meeting of the American Gynecological Society, Hot Springs, Va., May 21-23, 1923.

It might be well to give a brief summary of the leading factors taken from the histories and physical examinations on admission, which points may possibly be factors leading up to or having some distinct part toward causing this complication. The constant chief complaints were pain in the right lumbar region with frequent urination, pyrexia, increase of pulse rate, malaise, headache, chilly sensation, with nausea and vomiting. Weakness and constipation were invariably included in these symptoms. The ages varied from eighteen to forty-one years, sixty per cent were primiparae and of the multiparae no history of pyelitis during their previous confinements was given. Two gave a positive history of kidney complication during an illness of childhood. Three gave a family history of tuberculosis, others mentioned the usual diseases of childhood and occasional colds to which no significance was definitely attached, and all denied venereal diseases.

Likewise it would be well to summarize the findings of the physical examinations: The patients were generally undernourished, of average stature and showed a varying degree of anemia. In three cases a definite benign hyperplasia of the thyroid gland was demonstrable with no other evidence of glandular involvement. In none was there any evidence of any specific disease and no marked physical defects in skeletal development or deformities. The tonsils had been removed in fifty per cent, the remainder showed no cryptic or associated tonsillar diseases. There were no increased reflexes, palsies or areas of integument anesthesia. The teeth were invariably poor and several cases showed definite gingivitis with pyorrhea. Three gave evidence of cardiac lesions with normal compensation, and no acute or chronic lesions were demonstrable in the lungs. Five had had previous abdominal operations, such as drainage for suppurating appendicitis, ruptured left tubal pregnancy, etc. One patient gave a history of previous pelvic inflammatory disease, where removal of one tube and ovary was necessary. This might be considered of etiologic importance in the production of pyelitis in that the peritoneal adhesions involved the course of the ureter at the vesical neck, thus distorting or pulling the normal structures into abnormal position. A previous pelvic examination was made to determine the position and condition of the rectum, pelvic floor, vaginal walls, cervix and body of uterus. In the cystoscopic findings a definite edema of the vesical portion of the ureter, and an associated protrusion into the bladder or prominence of the infected orificial area were present in all severe cases. In seven cases only was cystoscopic examination and ureteral catheterization performed. In each patient repeated phthalein estimations of the whole urine were made and showed a percentage of from forty-seven to sixty-one. This varied considerably from time to time in the same individual. Four cases showed a definite cystocele

and rectocele, two a marked rectocele with little or no anterior wall involvement. Six showed bilateral lacerations of the cervix with eversion of the mucosa and hypertrophy. In one case there was a small benign cervical polyp. Both multiparae and primiparae had a vaginal discharge, varying from moderate thin white discharge to a profuse mucopurulent leucorrhea. Wassermanns were negative with all antigens throughout. Bacterial study of the vaginal and cervical discharge from smears and cultures gave only one positive Neisserian infection; the others were generalized mixed infections of low virulence and poor culture growth. The symptoms given in the history usually began early and were allowed to continue untreated and undiagnosed until systemic symptoms occurred, showing a definite pathologic kidney involvement which brought them under observation and treatment.

It is not my intention here to go into detail on the pathologic change that exists in the kidney during this complication other than to call attention to the fact that, in every instance where the clinical findings were definitely manifested, as pain in the kidney region, fever, chills, leucocytosis and purulent urine, the pathologic change in the kidney substance was accepted as a pyelonephritis and proved, incompletely, later in pyelograms of the kidney pelvis, blood and urinary findings. I wish to emphasize the fact that there is a close association of all the systems that go to make up the human organism and that if any of these intricate and delicately balanced structures fails or hesitates in its function during the months of pregnancy, it can readily throw one or more of the others into associated pathologic confusion. If, in the general study of pregnant women, all the systems are not most carefully considered and studied, some dreaded complication occurs in one which involves another, and so varied and perplexing does the situation become that often we are at a loss in the avalanche of clinical and pathologic evidence to determine the primary offending member.

Many and varied are the theories and factors on which eminent clinicians and scientists have placed this responsibility and blame, such as ascending infection of the kidneys from the lower portion of the urinary tract, absorption or transmission of the infection from the intestinal canal, and infection by way of the blood stream. More especially must we look to the combination of normal anatomic and physiologic changes that occur during pregnancy to place this responsibility.

Early in pregnancy there is a definite congestion and hyperemia of all the pelvic organs which is shared by the bladder. As pregnancy progresses these changes become more marked. Later an anatomic change in the position of the uterus occurs with a decided tendency

to tilt towards the right. Along with the uterus, after the third month, the urinary bladder ceases to be a pelvic organ and assumes the rôle of an upper pelvic or lower abdominal organ. The trigone of the bladder moves upward, in some cases quite up to and back of the symphysis pubis, with the associate lengthening of the urethra and the upward turning of the vesical portion of the ureters. There is a definite softening and lengthening of the ligamentous attachments allowing, to a greater or lesser degree, the ascent of the bladder along with the uterus towards and often out of the true pelvis. This has been proved by findings during cystoscopic examination where a decided lengthening of the urethra was present and at cesarean sections when catheterization has been done immediately preceding operation, the high position of the bladder and its misplacement to the left was so forcibly brought to attention. It is undoubtedly true that the mechanical action of the gravid uterus at the fifth month exerts its full effect upon the sharp pelvic brim directly over the course of the ureter, and in this way may produce a partial or complete occlusion of one or both ureters, while later in pregnancy it assumes a more decided dropping or sagging forward away from the posterior lateral walls, at which time the pressure is consequently relieved at that point. A further point of etiologic importance in the production of pyelitis is bladder retention incident to pressure of the pregnant uterus on the vesical neck. Previous history of pyelitis of infancy or in subsequent illnesses must be looked upon as a possible forerunner of pyelitis of pregnancy.

A leading factor and an interesting condition which exists, as those who practice obstetrics are fully aware, is that from the early months onward the urinary bladder in pregnancy contains varying amounts of residual urine. A catheter into the bladder of almost any pregnant woman immediately following the normal voiding of urine will determine a residual equal to, or larger than, the amount just voided. This complication and the persistency of it in cases of pyelitis along with the urinary findings lead us to suppose that here may be found another of the attributing factors in the pyelitis of pregnancy. The symptom which causes the first annoyance to the patient generally is frequency of urination. The microscopic examination of the urine at this time shows no marked excess of leucocytes or bacteria. There is no evidence manifested of systemic involvement either in pulse, temperature or blood examination. The primary symptoms are associated in the bladder, in my experience, with a varying degree of residual urine and never at any time in this series of cases was it possible to procure in blood culture a growth that might lead to the positive proof of a blood stream infection.

In this series cystoscopic examination showed the right kidney to

be involved in each instance. Many times the early symptoms of pyelitis are so transient and unnoteworthy from the patient's point of view that they are entirely ignored. If such be the case the condition is allowed to continue until it is so evident that associated analysis and studies are of little or no value, other than to prove the seriousness and magnitude of damage done in the organs involved. The early frequency of urination, whether on the feet or in bed, is such a common complaint by the patient as to often be dismissed with little or no treatment to rectify this distressing and harassing condition. Obstinate constipation has been claimed as a frequent factor in the causation of pyelitis and undoubtedly must play a definite part.

The anemia which appears early in pregnancy is largely due to the associated nausea and vomiting in the early months and is very definitely a factor, as it lowers the nutrition and eventually the power to resist infection. The nausea and vomiting deprive the individual of the adequate supply of fluids, and this too may lessen the power of the kidney to resist infection.

The lessening of the normal bladder reflexes in these cases was forcibly brought into prominence. The reflex showed marked variation. In some there was constant tenesmus, in others frequent inclination, while in still others there was no desire to void, under which circumstances the patient found it necessary to urinate at regular intervals and was unable to satisfy herself that the bladder was completely empty without undue straining.

In this entire group as far as the bacterial findings of cultured, catheterized specimens of urine are concerned, the one common organism found was the colon bacillus, but one case showed streptococcus aureus. It can well be said that the colon bacillus is the common bacterium in pyelitis. Further, this was so in all specimens obtained from ureteral catheterizations.

The cystoscopic findings were of interest. A definite cystitis was present with a marked hyperemia of the mucosa, most marked about the base of the bladder and trigone, and occasional hyperemic and edematous areas scattered over the bladder wall, usually in the lower portion. The ureteral orifice of the side involved showed a definite redness and swelling. The orifice was virtually occluded by edema and the vesical portion quite distinctly protruded into the bladder. Small amounts of what seemed to be cloudy urine were dribbling rather than being forcibly ejected into the bladder cavity. In not every case was ureteral catheterization performed. No necrotic areas of the bladder wall or hemorrhagic areas or polypoid growths, ulcerations or calculi were present. Pyelograms were made in only three instances and were not considered highly satisfactory, but showed an irregular, not sharply defined kidney pelvis and indefinite kidney substance involvement with little if any hydronephrosis.

General health and complete examination of teeth, tonsils and outside sources of infection were carefully considered, and in one case only could a focus be found. X-ray examination showed apical alveolar abscess at the base of the second lower molar on the right side. Pain, occasionally severe, was definitely localized over the right lumbar region and kidney area with intermittent radiation to the right groin and suprapubic region. Only once in this series were both kidneys involved. The blood picture was the same throughout, namely leucocytosis with the polymorphonuclear cells predominating, a varying mild anemia and a negative blood culture. The remarkable coincidence was that in every instance where the blood was typed it was in type 4 group. There was no maternal mortality, all recovered under treatment and completed the full term of gestation except one, on whom labor was induced at the seventh month owing to the gravity of the toxemia present, and the double kidney infection which gave grave fear for maternal life.

Early symptoms of frequency and bacilluria must be considered important enough at the onset to demand treatment: Rest in bed (milk and water diet) in Fowler or semi-Fowler position, instructions to take knee chest position three times a day for five minutes. Patients were requested not to sleep on the right side habitually. Immediate attention was given to free catharsis, sufficient to move the bowels thoroughly, yet not enough to dehydrate the tissues, or cause purgation sufficient to threaten interruption of pregnancy. Vaccine and intravenous medication, both of which were given a sufficient trial, proved to be of no benefit in checking the infection; they were annoying to the patient and caused excessive reaction without any material symptomatic benefit being derived from their administration. Irrigation of the kidney pelvis by ureteral catheterization did not prove curative even though the catheter was left in situ thirty-six hours with frequent flushings of the kidney pelvis. Both mild antiseptic and normal saline solution seemed to aggravate after a primary relief of symptoms. In the severe types where vomiting and general weakness were plainly manifested, proctoclysis of 5 per cent soda bicarbonate solution, one pint every six hours, was of distinct benefit. It gave the system its desired and easily absorbable alkaline fluid which showed at once in the increased urinary output with lessening of the toxemic symptoms. Subcutaneous injection of 500 c.c. of normal saline solution in the serious cases also gave the most pleasing and gratifying results. When the stomach was retentive, full and massive doses of potassium citrate, 120 grains in twenty-four hours, rendered the urine promptly alkaline and gave some definite relief of symptoms. Urotropin in small and large doses in both acid and alkaline urine gave no positive results or relief. Opiates

were used to relieve pain and were not held back in their administration. The infection usually ran a rather definite course of from seven to seventeen days' duration before the temperature and pulse rate became normal and the kidney and suprapubic areas of tenderness had disappeared, yet the pyuria and bacilluria in a number of cases continued without systemic manifestations all through the remaining months of pregnancy, and in several instances for some weeks after delivery. Hot applications over the kidneys were more soothing and better tolerated than cold. All foci of infection to which any attributing causative factor could possibly be traced were removed, as for example, suppurating alveolar abscess and infected tonsils. The acute cases require liquid diet, but as soon as possible easily assimilated, highly nutritious diet is essential.

The interruption of pregnancy in one case was followed by the immediate amelioration of symptoms and prompt return to normal. More pronounced and prompt was the recovery in this case, even though the condition was more grave than in those cases which were allowed to continue to term. The most gratifying results were obtained in cases that were conservatively treated, where no cystoscopic examination or ureteral catheterization was performed, and where the bladder was relieved of its residual urine and kept properly irrigated when the cystitis symptoms were excessive and troublesome to the individual.

SUMMARY

Pyelitis is a common complication of pregnancy. There is, as yet, no one specific cause on which to place the blame; it is rather the result of generally associated causes. The onset at first is mild and insidious, usually beginning after the bladder is drawn up out of its normal nonpregnant position from the third month onward. Bacilluria and frequent urination are present and usually precede the systemic manifestation of pathologic change in the kidney substance. The renal infection is primarily of hematogenous origin. The blood stream culture is invariably negative, because of the high germicidal qualities in the maternal blood. Obstruction along the lower urinary tract in most cases is an essential factor in promoting infection of the kidney and its pelvis. The infecting organism is most commonly found to be the colon bacillus. This organism may be the primary offending or a secondary invader upon an infection produced by other pyrogenic organisms.

The prognosis is excellent for the continuation of pregnancy with conservative measures; in only the exceptional case is it necessary to terminate pregnancy.

ABDOMINAL HYSTEROTOMY UNDER MORPHINE, SCOPOLAMINE AND LOCAL ANESTHESIA*

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THE indications for emptying the pregnant uterus in such serious conditions as heart disease where compensation has once failed, nephritis, and pulmonary tuberculosis are usually clear and definite. By removing the additional burden of gestation we may hope in many instances to restore the patient to a fair degree of health, or failing that, to save her from the immediate danger of death. The means of accomplishing this end, however, have always been far from satisfactory. We are confronted with a very sick individual whose end may actually be hastened if the method of delivery is injudiciously selected. Either the procedure we adopt or the anesthetic may be to blame in such an event. To avoid these dangers, so far as possible, I wish to suggest the use of abdominal hysterotomy under morphine, scopolamine and local anesthesia. Although the method is not perfect, I believe that our results in this class of patients are better than with delivery by any other method, since it provides us with a means of emptying the uterus devoid of any danger from the anesthetic and almost free from operative shock.

Before passing to a description of the technic employed and a summary of the results obtained I wish to bring out (1) the advantages of abdominal hysterotomy over the induction of labor or vaginal cesarean section and (2) the superiority of local anesthesia combined with morphine and scopolamine narcosis to general anesthesia.

The induction of labor is slow and uncertain. The uterine contractions set up by the introduction into the cervix of dilating bags, packs or bougies occasionally diminish or disappear. This necessitates the termination of labor either by vaginal cesarean section or by accouchement forcé, both of which require general anesthesia. On the other hand, should labor progress satisfactorily, the patient is afforded no escape from physical suffering or mental anxiety, both of which we believe are particularly injurious to women with heart disease who have experienced an attack of decompensation. Moreover, the induction of labor affords no opportunity to sterilize the patient and thus prevent the repetition of the same or a worse condition which might prevail were she not incapacitated for future pregnancy.

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Vaginal cesarean section becomes increasingly difficult the nearer the approach to term, nor does it allow of sterilization. Abdominal hysterotomy may be easily performed at any stage of pregnancy, although up to the fourth month some difficulty may be encountered in drawing up the uterus for incision. Resection of the tubes following abdominal hysterotomy is, of course, a simple matter.

Ether is by no means free from danger. Kemp has shown that it produces a marked contraction of the renal vessels without a rise in peripheral blood pressure. There results a diminution in the secretion of urine and in some cases its complete suppression. Enough injury may be done to the kidneys to produce albuminuria and hematuria. The work of Rogers indicates that the detrimental effect of ether vapor in pulmonary tuberculosis is largely due to an aspiration bronchopneumonia. The deep breathing which ether induces results in bacteria-laden material being drawn from a preexisting focus and deposited in other portions of the lungs by way of the bronchioles. The injurious effect of this anesthetic upon diabetics by causing acidosis is too well known to need comment. No definite proof has been presented that ether injures the heart directly. There is no doubt, however, that a number of cardiae have died from heart failure during or after ether anesthesia. This is apparently due to an increase in blood pressure resulting from respiratory spasm during the induction period, or later in the course of the anesthesia from failure to maintain an open airway.

Chloroform may be dismissed with a few words. Experimentally it causes degeneration of the liver and the cardiac muscle. According to McDowell the muscular coat of the bronchioles, which by its normal contraction prevents the admission of infectious material to the alveoli, is paralyzed by this anesthetic. The lung tissue may thus actually be destroyed, which would indicate that chloroform is not even safe for use in respiratory conditions.

Nitrous oxide is rapidly eliminated and produces no tissue changes in any organ. Combined with oxygen and skillfully administered it is an ideal anesthetic for the normal patient, provided no great degree of relaxation is required. However, in both heart disease and nephritis, should cyanosis occur, the blood pressure rises with disastrous results. It is thus evident that if gas-oxygen is used in the class of cases we are discussing, the safety of the patient lies to a great extent in the hands of the anesthetist. It would seem better that it should lie entirely in the hands of the surgeon.

In 1910 Smith and Schwartz reported two cesarean sections done under local anesthesia. In 1915 Webster reported 16 cases and stated that he had first done the operation in 1909. Cases have also been reported in 1918 by Trout and by Brown, in 1920 by Slemmons and

Johnson, in 1921 by Mowery, and in 1922 by Waldstein. In none of these cases was a systematic attempt made to induce preliminary narcosis by the use of morphine and scopolamine.

In 1916 I performed abdominal hysterotomy under morphine, scopolamine and local anesthesia upon a patient who, in brief, presented the following history. She entered the hospital with the diagnosis of rheumatic heart disease, with mitral stenosis. After admission she suffered a severe attack of decompensation. She had orthopnea, dyspnea, cyanosis, cold extremities, cough, vomiting, edema of the lungs and enlargement of the liver. The pulses were unequal, of poor quality and very rapid. A venesection was done and morphine and strophanthin given. Under rest and digitalis the patient had improved sufficiently twelve days later to justify emptying the uterus, the pulse then being about 110. The procedure was completed without incident and a five months' macerated fetus delivered. The patient slept throughout the operation and remembered nothing about it. She made a good convalescence and five weeks later was up and doing light housework about the ward.

The operation under local anesthesia was accompanied by morphine and scopolamine narcosis because it seemed a distinct advantage to have the patient oblivious to what was going on and thus avoid the psychic element, and because it was felt that novocaine would better produce its effect if thus supplemented. This proved to be the case. Only four of the thirty-one cases operated on by this method have had any recollection whatever of the operation, and those who remembered anything had a very indistinct impression of what went on. Patients thus operated on are spared the apprehension attendant upon local anesthesia without morphine and scopolamine narcosis. The freedom from anxiety and nervous tension thus obtained is not only of great benefit in heart disease on the verge of decompensation, but it makes hysterotomy under local anesthesia more merciful in all cases where the operation is indicated.

The technic which I have used is as follows:

About two and a half hours before beginning the operation the patient is placed in a darkened room adjacent to the operating room and, for the purpose of keeping out extraneous sounds, her ears are plugged with cotton soaked in oil. She is then given subcutaneously, morphine gr. $\frac{1}{4}$ and scopolamine hydrobromide gr. $\frac{1}{200}$. The morphine is not repeated, but at forty minute intervals the same amount of scopolamine is administered until the patient is dozing. Usually three or four supplementary doses of scopolamine are necessary. When the patient falls asleep a folded towel is placed over her eyes and she is transported gently to the operating room and placed upon the table. A nurse sits by her head and records the pulse rate at frequent intervals, but nothing is said to the patient under any circumstances. Absolute quiet is enjoined upon everyone in the room and the rattling of instruments or basins is carefully avoided. At this point another dose of scopolamine, gr. $\frac{1}{200}$, is given.

The site of the incision, which starts just below the umbilicus and ends above the pubis, is now infiltrated with 1 per cent novocaine, using a hypodermic syringe with a fine needle. With a larger needle and syringe the operator next injects the subcutaneous tissue and partially infiltrates the fascia by a series of punctures made downward at right angles to the skin surface. He now waits five minutes by the clock. If he starts the skin incision earlier he will arouse the patient and immediately get into difficulties.

At the end of five minutes he divides the skin and subcutaneous tissue, further infiltrates the fascia and incises it. The peritoneum is now injected with novomine



Fig. 1.—Two stay sutures have been introduced into the uterine muscle somewhat to the right of the midline. Traction by an assistant on these sutures holds the uterus in close apposition to the abdominal wall and corrects the usual right lateral torsion of the organ.



Fig. 2.—The uterus is incised between the stay sutures.

and opened in turn. The lower angle of the incision is drawn downward and to the right, and a stay suture of chromic catgut passed into the uterine muscle just above the bladder reflection of the peritoneum. With this suture left loose, the upper angle of the incision is now drawn upward and to the right, and a second stay suture placed.

As the assistant draws upward on the stay sutures he not only holds the uterus

in apposition to the abdominal wall and thus minimizes the spill of uterine contents into the peritoneal cavity, but he also corrects the usual right lateral torsion of the uterus by causing its anterior surface to rotate from right to left. In this way the incision made between the stay sutures will be more nearly in the median line of the organ than if that portion of it were incised which lay originally under the abdominal wound. (Fig. 1.)

Since the uterine muscle and its enveloping peritoneum are insensitive, no novocaine is here required. The viscus is opened cleanly between the stay sutures with a sharp knife. (Fig. 2.) If pregnancy has advanced beyond five months, the

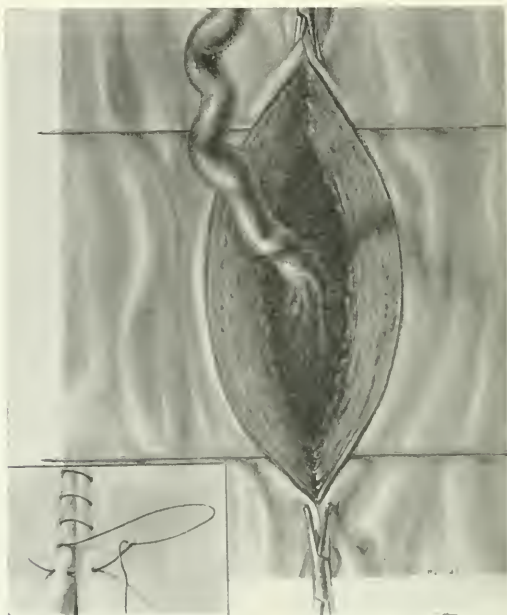


Fig. 3.—That portion of the uterus immediately surrounding the incision is temporarily fixed to the abdominal wall by two sharpened knitting needles which replace the stay sutures.

The small drawing shows the overlapping stitch with which the uterine serosa is closed.

membranes are ruptured, a foot grasped and the fetus extracted in the usual manner. If pregnancy has not reached five months, the intact ovum is separated by the fingers so that it lies free in the uterine cavity and is extruded through the uterine wound by pressure on the sides of the abdomen. In this way one may be sure that the uterus is completely empty.

The uterine musculature just beyond each end of the incision is now transfixed by a long, sharpened steel knitting needle which replaces the stay suture. The portion of the organ which we wish to suture now rests temporarily suspended in the abdominal wound, leaving the hands of the assistant free for other purposes,

effectively preventing any further spill and acting as a plug to prevent the extrusion of intestines. A towel is now placed on either side of the uterus under the needles and clamped to its fellow of the opposite side above and below. (Fig. 3.) If the patient is in the second half of pregnancy and the placenta consequently has not been removed with the ovum, it is now extracted. The operator then sutures the uterus in three layers, the first continuous, the second interrupted, and the third, the peritoneal stitch, which is continuous, is designed to overlap the serosa and give extra security against leakage through the wound.

If it is desired to sterilize the patient the long needles are removed and the uterine cornu on one side is located and drawn into the abdominal wound with a double tenaculum. (Fig. 4.) Since the tube is sensitive, the mesosalpinx below its proximal end is infiltrated with novocaine. A mattress suture is now placed beneath the uterine insertion of the tube and a half hitch made in it. The proximal inch and a half of the tube is excised, its uterine portion being removed by a wedge-shaped incision, and the mattress suture tightened by the assistant as this is done,

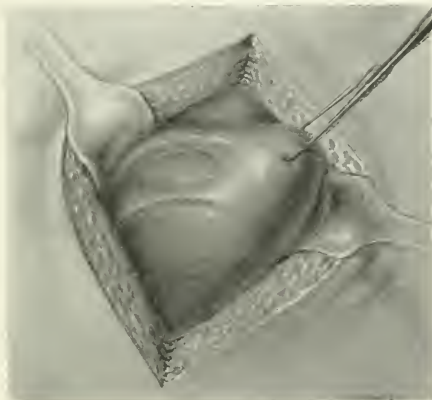


Fig. 4.—The right uterine cornu is drawn into the abdominal wound by a double tenaculum, exposing the proximal end of the right fallopian tube for excision.

thus checking bleeding. The cut end of the distal portion, having previously been ligated, is buried between the leaves of the broad ligament and all peritoneal surfaces approximated.

The same process is repeated on the other side and the abdominal wall closed. The sponging of any small amount of blood that may be left in the peritoneal cavity should be avoided as it will arouse the patient. The same holds true of traction on the parietal peritoneum, which should therefore be picked up in tissue forceps for suture instead of by the usual method of applying a number of hemostats. Before being put to bed a final dose of scopolamine is given.

Ocasionaly the patient mutters incoherently during the operation, and sometimes become somewhat delirious. This does no harm and need not disconcert the operator. Enough restlessness occurred on two occasions to require primary ether and on two others to necessitate gas-oxygen. This complication took place among our earlier cases and has been avoided in our later work by the use of the purest

preparation of scopolamine obtainable, and by more careful attention to details of technic. Postanesthetic vomiting is of course absent and operative shock is reduced to a minimum.

Thirty-one cases have been operated on by Dr. Newell, myself and other members of the staff of the Boston Lying-in Hospital at stages of pregnancy varying from seven weeks to full term. Fifteen viable infants were delivered and all survived. No injurious effect of morphine and scopolamine upon the fetus has been noted. It has been our experience that babies thus delivered have cried more promptly than those removed from the uterus when operating under ether anesthesia, and it is our practice to have them taken immediately from the operating room lest they arouse the patient.

INDICATIONS

Cardiac disease. Seventeen cases of heart disease who had been decompensated have been delivered by this method. In seven, previous breaks in compensation had been restored by appropriate treatment. One of these seven patients died of pulmonary embolism on the seventh day after a week of normal convalescence.

There were nine cases in which compensation had not been completely established but in which delivery seemed indicated because the patients were losing ground. One patient died from cardiac failure on the seventh day, and a second, who entered with the additional diagnosis of preeclamptic toxemia and with a blood pressure of 260/160 died of cardiac failure on the third day.

One patient entered in labor, badly decompensated and rapidly growing worse. Abdominal hysterotomy under morphine, scopolamine and local anesthesia was done because it seemed to offer the only possible chance of bringing the patient through alive, but death occurred in 24 hours from cardiac failure.

Cardiorenal disease. Two patients with cardiorenal disease were thus delivered with no deaths.

Of the 19 patients in whom the heart was affected, 4 died, a mortality of 21 per cent. If we deduct the case that died of pulmonary embolus on the seventh day as not being directly due to the condition for which the operation was undertaken we have a mortality from heart disease of 15.8 per cent. Since all these patients were extremely bad surgical risks we feel that our mortality would have been higher had we adopted any other method of delivery.

No further deaths occurred in the remaining 12 cases, which were operated on for the following indications: *Nephritis*, 3 cases; *pulmonary tuberculosis*, 3 cases, *diabetes*, 2 cases, one of whom had previously had a cesarean section.

Other indications. Three cases remain, all of whom had previously

been delivered by cesarean section. One had acute bronchitis and was in labor, the second, bronchial asthma and the third requested this method to avoid the discomfort of general anesthesia.

CONCLUSIONS

(1) Abdominal hysterotomy offers a method of emptying the uterus easily and rapidly in those cases where such a procedure is demanded.

(2) Local anesthesia under morphine and scopolamine narcosis is superior to general anesthesia because any possible danger from an inhalation anesthetic is eliminated and operative shock is reduced to a minimum.

(3) This method is, therefore, applicable to patients classed as bad surgical risks. Among such are cardiacs with previous decompensation, nephritics, diabetics, the pulmonary tubercular, or those who have acute respiratory infections upon whom it is necessary for other reasons to perform cesarean section.

REFERENCES

- Brown*: Am. Jour. Obs., lxxviii, 836. *Irving*: Boston Med. & Surg. Jour., clxxxii, 578. *Kemp*: N. Y. Med. Jour., Nov., 1899. *Mowery*: Jour. Kansas Med. Soc., xxi, 39. *Newell*: Trans. Am. Gyn. Soc., 1921, xvi, 362. *Simmons & Johnson*: Jour. Am. Med. Assn., lxxiv, 882. *Smith & Schwartz*: Surg. Gyn. & Obs., xi, 423. *Waldstein*: Wien. Klin. Wchnsch., xxxv, 825. *Webster*: Surg. Gyn. & Obs., Feb., 1915.

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(For discussion see p. 749.)

HYDROURETER AND HYDRONEPHROSIS: A FREQUENT SECONDARY FINDING IN CASES OF PROLAPSE OF THE UTERUS AND BLADDER*

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THE possibility that certain secondary changes in the urinary tract may result from the very marked bladder dislocation which associates practically all cases of prolapsus uteri has led to the present study. Clinically, we have repeatedly noticed the sallow, weakened expression of patients with long standing prolapse, their appearance of premature senility, though they may be of the fourth decade of life, indications of more serious functional disturbances than would arise from the mere physical deformity of the uterus. Uremic and suburemic manifestations are not infrequent in these patients, and are particularly apt to be encountered after an operation for the cure of genital prolapse. The operation, moreover, is still attended by an appreciable amount of shock which can not be accounted for by the duration of the anesthesia, loss of blood or by so-called surgical trauma.

The occurrence of postoperative shock in these cases, formerly more common than nowadays, was believed by us to be due to the prolonged sharp traction on the cervix during the operation. This traction on the cervix exerts in its turn a pull upon the ureters and kidneys and causes an irritation of their sympathetic ganglia including the adrenals. We have since learned from the study of ten cases of prolapse and one case of large cystocele without uterine prolapse that definite mechanical effects are produced in the ureters and kidneys by the uterine prolapse, and that these patients are necessarily predisposed to shock and uremia because of the damage to the kidney parenchyma. The effects upon the urinary tract by the dragging, prolapsed uterus are mainly to be seen in hydroureter and hydronephrosis.

Medical literature appears not to contain any clinical account of this association between uterine prolapse and kidney-ureter dilatation. Undoubtedly many gynecologists have noticed dilated ureters in cases of procidentia. There has, hitherto, been no general recognition of the fact that the uterine prolapse may bear an etiologic relationship to the ureter dilatation. The only reference to this fact that has come

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to our notice is to be found in the anatomic study of genital prolapse by Tandler and Halban. These authors report the incidental finding of 15 instances of dilated ureters out of the 23 autopsies described by them. Froriep, quoted by Tandler and Halban, mentions a finger-wide dilatation of the ureters in a case of hypertrophy, elongation of the cervix and prolapsus uteri and ani without cystocele. He supposed that the dilated ureters resulted from stasis in the bladder and kinking of the urethra. Tandler and Halban observe that, whereas

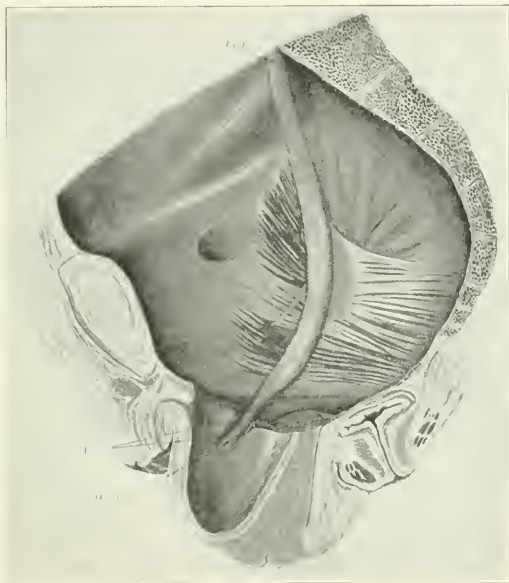


Fig. 1.—Hydroureter associated with uterine prolapse. Dilatation of almost entire length of ureter. Vesical end of ureter remains unchanged. (From Tandler and Halban, *Genital Prolapse*, Vienna, 1907.)

Froriep regarded this pathologic association between uterus and ureters as exceptional, their own investigation proved that ureteral dilatation and hypertrophy so frequently accompanied the prolapse as to constitute it a typical finding. Hirokawa in 1911 described two cases of genital prolapse in which ureter dilatation was noted at autopsy and discussed the relation between these two conditions.

The ureter dilatation was as wide as a finger (Fig. 1) in five of the cases described by Tandler and Halban, but, as a rule, varied with the size of the cystocele. According to these authors the dilatation

of the ureters is, generally, proportionate to the size of the cystocele. When the latter is slight the former is moderate or even quite absent. The whole ureter is dilated with the exception of its distal portion near the bladder entrance. This portion retains its normal caliber and thickness. The point of demarcation between the dilated and nondilated portions of the ureter was held by Tandler to correspond to the margin of the hiatus genitilis, i.e. the levator edges. The constriction to which the prolapsed bladder is subjected at this genital rupture ring is shared by the ureters and hence result the stasis and dilatation.

A hydroureter was not found by Tandler and Halban in those cases where the cystocele was so small as to permit the ureter to empty into the bladder above the hiatus genitilis. When the rupture ring was very wide the ureters escaped stenosis, because the neck of the bladder was not constricted. Furthermore, the absence of dilated ureters in the autopsies studied was explained by them on the ground that in the living state a pessary may have been worn, in which case despite the cystocele there was no compression at the hernial ring. Histologically, they found a uniform hypertrophy of the entire musculature. Elongation of the ureter was present in all their cases.

From Tandler and Halban's postmortem studies the association of dilated ureters with prolapse of the genitals appears fairly well established. While Froriep has referred to hydronephrosis as also occurring with the prolapse in the one section made by him, Tandler and Halban speak only of the ureters. They made no observation on the kidneys because in their autopsy material these had been previously removed. It seems almost too obvious to mention that hydronephrosis should be present when hydroureters are found. Tandler and Halban assumed that the kidneys in their autopsy material, though not seen by them, must have been the seat of hydronephrosis. While dilated and hypertrophied ureters by themselves can have very little clinical importance, dilated kidney calyces with parenchymatous compression may be of serious consequence to the patient.

THE MECHANISM BY WHICH SECONDARY HYDROURETER AND HYDRO-NEPHROSIS MAY BE PRODUCED

Dilatation of the ureters associating genital prolapse may be produced theoretically in several ways:

1. Kinking of the urethra and stasis in the cystocele; (hour glass formation of the bladder)
2. Intramural stretching in the bladder wall with stenosis.
3. Compression of the ureters outside the bladder.

Kinking of the urethra was given as a cause by Froriep. If this were the rule, however, these patients would suffer from great urinary

difficulty, which is not common. On the contrary there is more apt to be incontinence. Furthermore, as Tandler and Halban remark, the stasis of the ureter begins above the hiatus genitalis. If the latter is wide the ureters are not dilated, though the cystocele may be marked. When the ureter empties into the bladder at a point above the hiatus genitalis it is also not dilated.

Intramural stenosis of the ureter probably is not the cause of ureter dilatation, because the distal portion is normal for two or three centimeters from the bladder wall. This latter fact indicates the point of compression to be from outside the bladder. Tandler and Halban

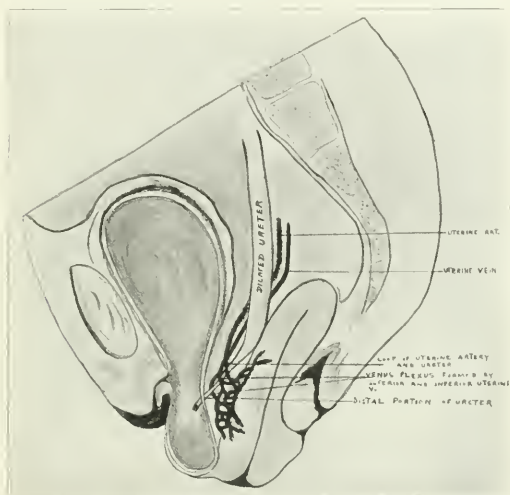


Fig. 2.—Constriction of the distal portion of the ureter by the uterine artery and veins in genital prolapse (schematic).

maintain this to be the edge of the levators which form the hernial ring of the genital prolapse. Their anatomic specimens apparently illustrate the point made by them. Inasmuch, however, as the levators are frequently so stretched as to be very thin, weak muscle bands, while on the other hand the bladder capacity varies frequently throughout the day, this cause is more apparent than real. Were the bladder a solid organ it would with the uterus form a sufficient body to cause constant and effective compression of the ureters against the levators, resulting in stenosis and dilatation. In the absence of this factor, the bladder would have to be filled constantly with a

sufficient quantity of urine to produce hydrostatic pressure on certain fixed points of the ureters. Owing to the frequent emptying of the bladder in these cases, the hypothesis of the constriction at the hiatus genitalis obviously does not hold true for all the cases.

Another factor besides compression of the levators or the cystocele must therefore be present to account for the constriction of the ureters, and we believe this to be by the uterine artery and uterine veins. The ureter is looped by the uterine artery which crosses it in the paracervical tissues. The uterine veins form a plexus which, with the artery, surrounds the ureter entirely (Fig. 2). Although an elongation of the ureter and the uterine artery takes place in more or less parallel fashion, the pull in the ureters exerted by the abnormally dependent cervix and uterus forms a constriction at about the point where the postmortem studies of Tandler and Halban and our pyelograms on the living subject show it to be. Inasmuch as the veins are frequently distended, almost varicose through prolonged stasis, and thickened, it is not difficult to see how vascular constriction of the ureter may result. Hydronephrosis due to kinking of the ureter by abnormally large vessels at any point along the course of the ureter has been described by Howard Kelly and others.

The loop formed by the ureter and uterine artery (the urovascular loop) would therefore be a point of predilection for ureter constriction under the abnormal anatomic circumstances which exist in genital prolapse. In this connection it may be mentioned that this point forms another of the physiologic constrictions of the ureters in women. Ureter stones are very apt to be caught at that point. Moreover, the great frequency with which Hunner encounters strictures in the ureters in women may also be partly explained by this anatomic relationship between ureter and uterine vessels.

The urologic examination of the ten cases of genital prolapse and one case of cystocele not associated with prolapse has been undertaken, first to demonstrate the clinical presence of hydroneurter and hydronephrosis, and secondly to determine the degree of kidney damage, so as to help us formulate more precise operative indications and contraindications in these cases. We have adopted the plan of first testing the capacity of the ureters and renal pelvis and then resorting to pyelography. Only one ureter and renal pelvis need be injected to serve for demonstration purposes, and also to avoid the unnecessary pain which very often accompanies the pyelography. In this work we have been fortunate in enlisting the cooperation of Dr. A. Hyman, associate urologist to the hospital. The cystoscopic examinations, as herein reported, were practically all made with his assistance.

CASE REPORTS

CASE 1.—M. S., aged sixty-eight, had been married 40 years, 6 children; menopause 15 years ago. Urinates 5 to 6 times a day, prolapse for the past 6 years, pessary not worn by patient.

Examination.—Large cystoectocoele and complete prolapse of uterus. (Fig 3.)

Cystoscopic Findings.—Numerous superficial diverticula. Left ureter obstructed at 1 cm. from orifice; a No. 6 catheter then passed point of obstruction. Right ureter also obstructed at the same distance from the meatus when the catheter finally passed. A profuse flow of clear urine from both sides followed. Pressure over kidney caused acceleration of flow which was already rapid. Blad-

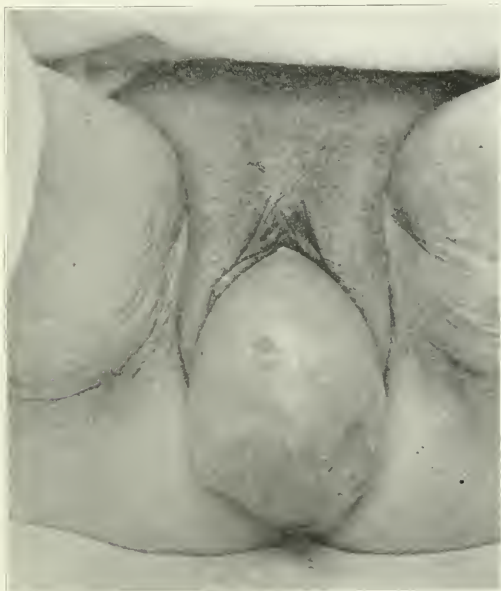


Fig. 3.—Photograph of Case 1, complete procidentia.

der was emptied in order to determine reflux, but none was present. The left ureter was injected and tolerated 30 c.c. of sterile water. The right ureter tolerated 25 c.c.

Urine examination of cystoscopic specimen.—Left: urea, 12 mg. per c.c.; microscopic, numerous clumps of white blood cells.

P. S. P. Output.—First 2 hours 25 per cent; third hour 25 per cent.

Urine examination on admission.—Faint trace of albumin, sugar 1.8 per cent. occasional red blood cells, acetone and diacetic acid present.

Blood chemistry.—Urea nitrogen 26.6, incoagulable nitrogen 56.6, sugar 0.172.

Blood pressure.—150/90. Pyclograms were made. (Fig. 4.)

CASE 2.—S. M., aged fifty-eight, had been married 32 years, four children, oldest

28 years, youngest 19 years. Menopause 9 years ago; prolapse for the past 8 years; patient has worn a ring pessary.

Examination.—Small rectocele, lacerated cervix, slightly eroded; huge cystocele the whole bladder being prolapsed. (Fig. 5.)

Cystoscopic examination.—Bladder completely prolapsed through introitus. Right ureter found after restitution of bladder. A catheter was easily introduced, and passed up to the kidney pelvis. Owing to numerous folds and distortions the



Fig. 4.—Pyelogram (sodium bromide) in Case 1, showing bilateral hydronephrosis. The right ureter is distended with the opaque solution. The left renal pelvis is dilated; left ureter is empty of opaque solution.

left ureter was more difficult to identify. But with the removal of pessary and vaginal manipulation restoring the normal relations of the trigone, the left ureter was located and a catheter passed up for a distance of 5 cm. A test tube filled in 2½ to 3 minutes on the right side. On the left side the test tube filled considerably slower. Ureter orifices fairly small. Good concentration of indigo-carmin on left side in 10 minutes; faintly on right. Introduced 6 c.c. of sterile water into left ureter. Patient complained of severe pain on left side. Fifteen c.c. of water was introduced on right side before patient complained of pain.

Diagnosis—Hydronephrosis of right kidney. No pyelogram was taken. Note the unilateral hydronephrosis in complete procidentia in case where a pessary support was worn from almost the beginning of the prolapse.

CASE 3.—F. B., aged fifty-four; had been married 34 years; 4 children, menopause at 48 years. Prolapse for the past ten years; protrusion has become worse during past two months. No pessary had been worn by her.

Examination—Complete prolapse of the uterus. Large cystocele.

Cystoscopic findings—Bladder markedly prolapsed and deformed. Ureteral or-



Fig. 5.—Photograph of Case 2. Complete procidentia. Unilateral hydroureter, capacity of right renal pelvis and ureter 15 c.c. (patient had worn a pessary).

fices could not be seen until cystocele was reduced. No cystitis found. *Right ureteral mound* was very prominent. No obstruction in ureter to passage of catheter. On aspiration, the pelvis was found filled with about 14 c.c. of urine. No indigo carmine appeared in 35 minutes. Profuse flow from the kidney. Capacity of renal pelvis was 35 c.c. *Left ureteral mound* was not as prominent as the right. No obstruction in the ureter and no retention. Normal flow. Good indigo-carmin output in 10 minutes. Capacity of renal pelvis not tested.

Diagnosis—Right sided hydronephrosis.

P.S.P. Output—First 2 hours 90 c.c., 45 per cent; second 2 hours 50 c.c., 25 per cent; four hours total 70 per cent.

Urine examination of cystoscopic specimen—

	right	left
urea	2.6%	0.95%
microscopic	many red blood cells, numerous epithelial cells, few white blood cells.	numerous red blood cells many epithelial cells.



Fig. 6. Pyelogram of the left ureter and renal pelvis in Case 1. Complete prolapse. Capacity of left ureter 50 c.c., of right ureter 25 c.c. The ureter is markedly distended, tortuous and elongated. The distal end is normal. The bladder contains reflux bromide solution.

Urine examination on admission

Amt.	Char.	Reaction	Sp. Gr.	Alb.	Sugar	Microscopic
q.s.	clear	acid	1030	faint trace	0	many hyaline casts and white blood cells.

Blood chemistry—Urea nitrogen 25.2; incoagulable nitrogen 50.0; uric acid 5.2; creatinin 1.1.

Blood pressure 160/80. Pyelogram on right ureter taken.

CASE 4.—C. R., aged forty-five; married 17 years, 3 children. Prolapse of 6 years' duration; no pessary had been worn by her.

Examination—Complete prolapse of uterus, cystocele.

Cystoscopic findings—Bladder negative, both ureters catheterized. Capacity of left ureter over 50 c.c. Capacity of right ureter 25 c.c.

Diagnosis—Bilateral hydroureter and hydronephrosis.

Urine examination of cystoscopic specimen—

	Right	left
urea	1.6 mg. per c.c.	1.8 mg per c.c.
microscopic	very many epithelial cells, few red blood cells, no pus cells, no casts.	some epithelial cells no red blood cells, no casts.

Urine examination on admission—

Amt.	Char.	Reaction	Sp. Gr.	Alb.	Sugar	Microscopic
q.s.	clear	acid	1020	0	0	negative

Blood chemistry—Urea nitrogen 12.6 mg. per 100 c.c.; incoagulable nitrogen 42.3 mg. per 100 c.c.; uric acid, quantity not sufficient for determination; cholesterol 0.142 per cent.

Blood Pressure—130/78. Pyelogram of left ureter was made. (Fig. 6.)

CASE 5.—A. K., aged sixty-three, married 40 years, 6 children; oldest 35 years, youngest 27 years. Patient has had prolapse for 14 years, during which time she has worn a pessary. For the past 8 months patient has not worn this pessary and prolapse has become increased.

Examination—Prolapse of atrophic uterus, with a moderate size cystocele and small rectocele.

Cystoscopic findings—The bladder shows the usual deformity in prolapse; both ureteral mounds are prominent. The ureter catheters on both sides met with some obstruction at 3 cm. This obstruction was readily overcome and ureters catheterized to pelvis. Clear pale watery urine from both kidneys; rather rapid flow. Capacity of right pelvis, 14 c.c., left pelvis 18 c.c.

Diagnosis—Hydronephrosis of both kidneys. No pyelograms taken.

CASE 6.—B. K., aged forty-four, married 14 years; 4 children living and well. Chief complaint, frequent urination. Periods have been normal except for diminution in flow; prolapse of uterus for the past 2 months. No pessary worn.

Examination—Partial prolapse of uterus and also of anterior vaginal wall.

Cystoscopic findings—Bladder distended, ureteral meati normal. Right ureter catheter was obstructed just within the meatus and finally overcame it occasioning some traumatic bleeding. Very slow flow, capacity of pelvis 8 c.c. Left ureter catheterized without obstruction, clear urine obtained. Capacity of pelvis 12 c.c. Findings indicate a very moderate dilatation of the left pelvis and a normal right pelvis.

Urine examination of cystoscopic specimen—

	right	left
urea	1.6 mg. per c.c.	1.8 mg. per c.c.
microscopic	many red blood cells, occasional hyaline casts	occasional granular cast
Guaiae	Positive	Negative

Urine examination on admission—

Amt.	Char.	Reaction	Sp. Gr.	Alb.	Sugar	microscopic
q.s.	clear	acid	1020	faint	0	few white blood cells
				trace		

Blood chemistry—no blood for chemistry taken.

Blood pressure—120/90. No pyelograms were made.

CASE 7.—A. A., aged fifty, had been married 30 years; 5 children. For the past 20 years patient has had prolapse of the uterus. This has steadily increased in size so that now a mass the size of a large orange protrudes. For the past year she has complained of pain in the pelvis, and in the prolapsed organ. No pessary had been worn.

Examination—Complete prolapse of the cervix which is hypertrophied and slightly lacerated. The uterus is atrophic. There is a large cystocele and a small rectocele.

Cystoscopic findings—Besides the usual deformity of the bladder, as encountered in prolapse, there is no abnormality. Both ureters were catheterized without obstruction. A pale watery urine was obtained from both kidneys. The capacity of the right pelvis 8 c.c., the left pelvis 9 c.c.

P.S.P. Output—First hour, 26 per cent; second hour, 23 per cent.

Urine examination of cystoscopic specimen—

	right	left
Urea	1 mg. per c.c.	1 mg. per c.c.
Microscopic	few epithelial and granular casts	marked epithelial casts.

Urine examination on admission—

Amt.	Char.	Reaction	Sp. Gr.	Alb.	Sugar	microscopic
q.s.	clear	acid	1008	trace	0	occasion hyaline and granular casts.

Blood chemistry—no blood taken for chemistry.

Blood pressure—125/65. No pyelogram taken.

CASE 8.—B. G., aged forty-nine, married 29 years. Three children living and well. For the past 6 years patient has had prolapse of the uterus which is now constant. Complains of some pain in the pelvis, has never worn a pessary.

Examination—Large lacerated, eroded cervix, protruding through the vulva. Both vaginal walls protrude.

Cystoscopic findings—Bladder markedly deformed on account of prolapse. Both ureteral mounds prominent. Right ureter obstructed just within meatus and cannot be passed further. No specimen obtained. Capacity of pelvis cannot be determined as the blue injected cannot be returned. Left kidney, rather rapid flow, clear urine. Pelvic capacity 14 c.c. These findings indicate a moderate degree of hydronephrosis of the left kidney.

Urine examination of cystoscopic specimen—

	right	left
urea	1.8 mg. per c.c.	1.8 mg. per c.c.
microscopic	negative	negative

Urine examination on admission—

Amt.	Char.	Reaction	Sp. Gr.	Alb.	Sugar	Microscopic
q.s.	clear	acid	1024	0	0	negative

Blood chemistry—No blood for chemistry taken.

Blood pressure—155/95. No pyelogram taken.

CASE 9.—A. H., age forty-six, had been married 25 years; one child 24 years old, no other pregnancies. Falling of womb for 10 years. Has worn a ring pessary at irregular periods.

Examination—Moderate cystocele, large rectocele. Anterior lip of cervix is elongated and protrudes on deep straining to the introitus. Uterus slightly enlarged.

Cystoscopic examination—Ureters considerably displaced. Capacity of left pelvis is 6 c.c. Capacity of right pelvis is 8 c.c.

P.S.P. Output—First hour 410 c.c., 25 per cent; second hour 100 c.c., 16 per cent.

Urine examination of cystoscopic specimen—

	right	left
urea	18 mg. per c.c.	14 mg. per c.c.
microscopic	many red blood cells.	negative
Guaiaac	faintly positive	negative

Urine examination on admission—

Amt.	Char.	Reaction	Sp. Gr.	Alb.	Sugar	Microscopic
q.s.	clear	acid	1020	0	0	negative.

CASE 10.—P. S., aged sixty-two years, unmarried, occupation that of infants' nurse. Falling of womb for the past 9 years. Menopause at 46 years; no pessary worn but supported it with a napkin. For the past 6 months she cannot replace it. There is no urinary difficulty.

Examination—Uterus is prolapsed; a small polypoid excrescence is present on anterior cervix lip. Perineum is intact. On deep straining a small cystocele becomes apparent.

Cystoscopic examination—Bladder normal. Catheters passed up to both kidney pelvis. Clear urine obtained from each, no obstruction in either ureter. Capacity of right pelvis is 14 c.c., of the left pelvis is 12 c.c.

P.S.P. Output—First hour 120 c.c., 17 per cent; second hour 150 c.c., 9 per cent.

Blood pressure—172/102.

Urine examination on admission—

Amt.	Char.	Reaction	Sp. Gr.	Alb.	Sugar	Microscopic
q.s.	clear	acid	1014	trace	0	an occasional hyaline cast.

Urine examination of cystoscopic specimen—

	left	right
urea	18 mg.	22 mg.
microscopic	many red blood cells and an occasional hyaline cast.	a few red blood cells
Guaiaac	1 plus	negative

CASE 11.—S. J., aged forty-five, married 26 years, six children; still menstruating, torn badly at confinements.

Examination—Large cystocele, moderate rectocele. Cervix bilaterally lacerated. Uterus retroposed.

Cystoscopic examination—Clear urine from both ureters. Catheterized without obstruction. No ureter orifice changes. Capacity of left pelvis 5 c.c., right pelvis 18 c.c.

Diagnosis—Moderate hydronephrosis of right side.

SUMMARY AND CONCLUSIONS

Of the ten cases of prolapse, six were complete procidentias with large cystoceles and four were partially prolapsed. The cervix in these four cases was markedly hypertrophied and elongated, as was the portion of the uterus that protruded through the introitus. Eight of the cases had hydroureter and hydronephrosis. In two the urologic examination failed to show any abnormality. It is interesting to note that these were partial prolapses, one of which was accompanied by a large cystocele and the other by a moderate sized cystocele. There were four cases of bilateral hydronephrosis, and the other four had only one sided lesion. In general the complete prolapses were associated with large cystocele and showed the bilateral kidney-ureter dilatation. In one case (Case 10), that of an elderly nullipara with a slight cystocele, the dilatation of the renal pelvis was bilateral, but of a moderate degree. In one other case (Case 11), that of a large cystocele and no prolapse, there was a moderate unilateral hydronephrosis showing that the dislocation of the bladder itself produces ureteral stasis and dilatation.

Pessaries were worn by only three of these patients. In one of these there was a unilateral hydronephrosis; in another, a moderate bilateral hydronephrosis. This patient had done without the pessary for eight months preceding the examination. In the third case no dilatation was found although the patient wore the pessary at irregular intervals.

In general it may be said that the older the patient and the longer the duration of the prolapse, the more likely will the dilatation of the kidney pelvis and ureters be associated with it. From the large percentage of hydroureter and hydronephrosis encountered in the cases of prolapse of the uterus with cystocele, (80 per cent) of the cases forming the basis of our study it is fair to conclude that there is an important etiologic relationship between the two conditions. When taken together with the high incidence, 15 hydroureters in 23 autopsies reported by Tandler and Halban, there can be no question as to the secondary effects produced upon the kidneys by long standing uterine prolapse.

It becomes at once clear that the need for early operations to correct descent and genital prolapse must be recognized. Pessaries in inoperable cases offer relief of the prolapse itself and also save the kidneys from secondary damage.

In advanced, neglected cases it becomes all the more important to take measures to study and conserve kidney function before undertaking operative correction of the prolapse. Greater attention to phenolsulphonephthalein and indigo carmine output, to extent of the blood for nitrogen retention, etc., may indicate the extent of

kidney damage entailed by these women with genital prolapse. Simple testing of the capacity of the renal pelvis and ureter by the use of sterile water alone will be sufficient to determine the degree of ureteral dilatation. The injection of sodium iodide or of sodium bromide in solution will be reserved for doubtful cases, and one ureter will be adequate for the demonstration.

Finally, it may be well, when undertaking established operations for the cure of uterine prolapse or in planning newer methods, to consider the relief of the ureter and kidney dilatation. Postoperative urologic examination will ultimately indicate the best procedure to be adopted in these cases. At the present time it may be stated that ventro-suspension along with the vaginal plasties would meet these requirements. Care should be taken however to avoid too high elevation of the uterus.

Inasmuch as the cystoele plays an important part in the production of the ureter dilatation it is clearly an indication for early operative correction.

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THE TOXEMIAS OF PREGNANCY VIEWED FROM THE STANDPOINT OF CHRONIC SEPSIS AS THE ETIOLOGICAL FACTOR

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OBSERVATIONS made during the last two years which tend to show that the placental infarct is the result of hematogenous infection of the placental site have, I believe, illuminated this much discussed subject, the etiology of the toxemias of pregnancy. These observations have been set forth in three papers¹ of which the following summary may be made.

1. The white placental infarct is the end-result of a hemorrhagic lesion, its evolution being described as a coagulation necrosis.

2. The lesion is a discrete process, often multiple and often repeated in the same placenta.

3. The placental lesion is secondary to a hemorrhagic lesion in the maternal blood vessels of the placental site.

4. There is clinical and histological evidence that the primary lesion in the maternal blood vessels of the placental site is infectious in origin.

5. The clinical sequence of events observed shows that the lesion

is the result of hematogenous infection and that the source of the infection is generally to be found in the teeth and tonsils.

6. By the determination of the infectious origin of placental infarcts, a large clinical entity is demonstrated in pregnancy which has chronic sepsis as its initial lesion.

In these papers it has been the endeavor of the writer to show not only that the placental infarct is the result of hematogenous infection of the placental site, but also that much of the pathology of the products of pregnancy which is so frequently found in association with toxemia of pregnancy is in reality dependent on this principle of hematogenous infection of the placental site. In this paper it is to be my endeavor to draw a conception of the process by which hematogenous infection from foci of chronic sepsis produces the symptoms which go to make up the disease entity, known as toxemia of pregnancy with or without convulsions.

Although the writer is well aware that many of the ideas advanced are unsupported by laboratory evidence, nevertheless he is so convinced of the principle of hematogenous infection as the source of most of the infarcts of the placenta that he feels that he is justified in advancing the following conception and supporting it by the application of this important principle and by analogies from other disease complexes.

The process involved in producing a new individual is the most severe physiological function test which the human system has to endure. Every metabolic organ is called into play in pregnancy. This call is necessarily in addition to the ordinary demand on those organs which have to do with maintaining the life of the individual. The demand of the growing fetus may be considered a great mobilizer of every organ which has to do with supplying those chemical compounds which go to the building of the new individual. The whole system of the woman is therefore undergoing a constantly increasing strain until the fetus is mature and thrown off.

By what process is this demand carried to every organ of the maternal system? The answer to this question raises the mooted point as to whether the metabolic changes in the body are purely the result of specific hormones or whether the sympathetic nerve system plays an important part. It is suggested that the advent of the waste products of the proliferating ovum into the blood stream of the maternal organism may throw out of balance a state of equilibrium between the waste products and the products for anabolism in the blood stream of the mother. This excess of waste products may thus act as a call upon the system to increase its anabolic processes to maintain equilibrium. It is equally probable that these by-products of the ovum may have a specific character and be true hormones. It is however unreasonable to neglect that great silent system of

sympathetic nerve fibers in our conception of the many metabolic balances between organs which we know must exist. It is my conception that this vast nerve system has as its primary function the corollation of the functions of the many metabolic organs and that the blood stream is not merely a mass of chemicals and catalyzers without the assistance of the sympathetic system in maintaining equilibrium in the functions of the many organs of the body. This view has been supported by recent investigation² which shows that certain glands of internal secretion are under the control of the sympathetic nerve fibers. It is also an accepted fact that smooth muscle is under the control of the sympathetic nerve system.

Instead of the usual balance between the anabolic and katabolic processes of the body, the system is stimulated in pregnancy so that the anabolic processes must exceed the katabolic processes, the increasing size of the fetus causing a gradually increasing demand or strain upon these anabolic processes and this strain is in part borne by the sympathetic nerve system in its function of corollating the functions of the separate organs.

Side by side with this process goes the increased strain on the excretory organs of the body necessitated by the need of carrying off the increase in waste products resulting from this general increase in the metabolic rate within the body. Some of this strain required by the necessary corollation between the metabolic and excretory functions of the body must be borne in part by the sympathetic system.

It is this increase in the activity of the somatic nerve stimuli passing over the sympathetic nerve system as the result of a normal pregnancy which I wish to bring clearly to the mind of the reader. The tone of the whole sympathetic system is raised above its normal level.

It does not seem necessary to enumerate in detail the symptoms of toxemia of pregnancy. It is important to emphasize the point however that these symptoms are not confined to the pregnant state. It has been, I believe, truthfully stated that there are no symptoms of chronic nephritis which do not appear in the syndrome of toxemia of pregnancy. This fact seems to warrant the drawing of a very careful line between the symptoms of the patient as a result of the toxemia, and the pathology of the pregnancy itself which is found in association with the toxemia. As has been stated above much of the pathology of the pregnancy itself can be attributed to infection of the placental site.

The frequency with which placental infarcts of infectious origin appear in placentas tends to show that bacteria pass in the blood stream of the individual much more frequently than has hitherto been supposed. This must mean that not only the placenta but other organs

and tissues of the body are likewise attacked by these emboli of bacteria.

That these other tissues do not show evidence of damage as often as the placenta can be explained. The conditions in the placental site are especially favorable for the lodgment and activity of the emboli which for the most part are made up of bacteria of a very low grade of virulence. In the first place the placenta and the placental site is a region undergoing rapid proliferation of tissue. In all proliferating tissue there must be a large number of trabeculated capillaries which would act as meshes for catching these emboli and giving them opportunity to enter the tissues. Since the edge of the placenta is the site of the most rapid proliferation, this accounts for the observation that the edge of the placenta is the part most frequently infarcted.

In the second place a newly produced tissue in all probability has not as high a resistance to the invasion of bacteria as the other tissues of the body. Without doubt many of these emboli of low grade bacteria do lodge in the other tissues of the body but on account of Nature's defensive processes they produce little or no disturbance. This phase of the problem involves the kind of bacteria, their virulence and the resistance of the tissues attacked. It is when these factors are out of balance that we find damage in other organs of the body.

Is this conception of single bacterial embolus or showers of bacterial emboli from foci of chronic sepsis applicable to the known pathology of toxemia of pregnancy and eclampsia?

The recent review of the pathology of toxemia of pregnancy by Kosmak³ is most illuminating in this connection. He shows that the characteristic lesions in many different organs are minute hemorrhages. The following quotations are in point: "Eclampsia, characterized by focal cell degeneration and necrosis, as a result of thrombosis of the smaller vessels (of the liver) is represented by eclampsia with or without convulsions. *Subcapsular hemorrhages are common.*"

In regard to the kidney, "In eclampsia the kidney is not diminished in size, (an acute process), the appearance is anemic, (due to edema), the cortex is cloudy and in many instances (not constant because of the different stages in which they are examined) presents *small punctate ecchymoses.*" (The explanatory words in the brackets are my own.) "The capillary vessels show stasis and may contain actual thrombi." "Infarcts are present and are due to the migration of emboli from other organs." "Renal changes were found by Polak in 98 per cent of 139 autopsies of eclampsia."

"Although kidneys and liver present the most frequent and most characteristic pathological changes at autopsy, almost all the organs may be more or less involved. *Hemorrhages* may take place into the

lungs, and pleura, pericardium, cranial cavity and brain, gastric mucosa, peritoneum and skin."

How similar are these multiple hemorrhagic lesions to those in the blood vessels of the placental site. How similar the conditions may be said to be to those in miliary tuberculosis which represents a shower of tubercle bacilli into the blood stream as distinguished from a few embolic processes which result in a single tubercular kidney or other discrete lesion.

Acceptance of this conception explains the finding that red infarcts, in other words the acute or fresh infarcts, are most commonly associated with an acute nephritic condition in the patient. These fresh lesions in the placenta and kidney may be both simultaneous results from a shower of bacterial emboli from some common focus elsewhere in the body.

Kosmak also states, "that bronchopneumonia and extensive pulmonary edema are often found in cases progressing to a fatal ending several days after convulsions have ceased." In this connection it must be remembered that all hematogenous infections enter the blood stream on the venous side and must pass through the lungs before they are scattered about the body.

"Hemorrhagic lesions in the brain have been noted in most autopsies in eclamptic subjects, both substance and cortex being involved."

It must be remembered that the pathologic findings here reported are all the result of an infection sufficiently virulent and sufficiently general to cause death. All grades of these findings of lesser intensity are undoubtedly present in those individuals who recover from the disease. Thus the process grades off to the single infarct in the placenta, to the attack of pyelitis, to the breast abscess or the threatened breast abscess.

With our present knowledge of the different kinds of bacteria involved in areas of chronic infection, their graded virulence and the wide variation in resistance to bacterial invasion of different individuals and different tissues, does not this conception offer a picture entirely in harmony with the rest of our knowledge of infectious disease? Is not the picture of the pathology of the disease rendered less confusing, in fact, is it not unified when we consider the simple character of the lesion, a hemorrhagic lesion in both the placental site and the other organs of the body and the single character of the means by which it is scattered about the body, the principle of hematogenous infection? Is not the picture of a hemorrhagic purpura, or a miliary tuberculosis exactly similar as to principle?

Not only is the pathology consistent with the conception that the disease is a systemic infection but also the clinical picture is more than merely suggestive. Most all eclamptics who die have a con-

siderable degree of fever. Kellogg⁴ has also recently shown that toxemias are very prone to sepsis (as shown by an elevated temperature). He states that 2.5 per cent of non-toxemias unselected became septic, 14 per cent of toxemias without convulsions became septic, 25 per cent of toxemias with convulsions became septic, *irrespective of the method of delivery*. These figures show plainly the graded potency of the infection present in the system.

With this picture of the multiple spotting of bacteria throughout the system sometimes as a single embolus, sometimes as a shower of emboli, is it any wonder that the corollation of the functions of the different metabolic organs becomes upset? If the liver or the kidney becomes the seat of many minute hemorrhagic lesions their function must certainly be disturbed at least temporarily. In addition to the load of producing a new individual there is therefore the load of fighting an attack from the invading bacteria.

It is well known that an acute infection will sometimes precipitate a toxemia of pregnancy. This is not the result of the damage which this infection causes to the placenta but of the upsetting and overloading of the metabolic system which is already under stress. If however this acute infection subsides and the resistance of the system is sufficient to overcome the attack, nothing but a temporary disturbance results. If this so-called acute infection is in reality an acute exacerbation of a chronic process and the repetition of emboli continues from the chronic focus, it is under such a set of circumstances that the acute infection may be the precipitating cause of a slow or rapid toxemia.

It is this conception of the processes involved that makes me believe that toxemia of pregnancy is almost never the result of a single acute infection of short duration. It is the long standing infection with its often repeated emboli of bacteria which repeatedly disturbs the metabolic balance necessitating greater and greater effort on the part of the system to compete with the constantly ascending strain upon which it is placed.

The end result of all this stress is reflected in an increased tone in the sympathetic nerve system. Smooth muscle throughout the body receives its share of the increase of nerve stimulation and its tonus is raised. This is reflected by the rise in blood pressure and tendency to constipation. A condition of increased tone or spasticity results in the smooth muscles surrounding the arterioles and the intestine. This hyperstimulated condition is further reflected by the fact that the patient is often nervous in the sense of having a sensation of tension with no definitely localized symptoms. Sleep is often difficult to obtain, is fitful and not as restful as usual. In this connection it should be borne in mind that the adrenal gland, whose secretion we know

affects the blood pressure, is embryologically and functionally in the closest association with the sympathetic nerve system.⁵

As the demand of the pregnancy gradually increases, these repeated stimulations result in many minor discomforts. The sympathetic nerve system is in a situation similar to that of a motor neuron receiving a subminimal stimuli which, when summation is reached, results in a contraction of the muscle under its control. In other words the stimulated condition of the sympathetic system reaches the threshold of the synapse which separates it from the motor and sensory nerve system. Cramps in various muscles may be suggested as minor evidences of this condition. Twitching sensations and paresthesias also fall into this class of minor symptoms. When the strain on the system becomes profound with high blood pressure plus the damage to the liver and kidneys resulting in inefficient elimination, then the synapse threshold of the brain cells is finally crossed with the resulting motor activity characteristic of the convulsion. Epigastric pain, the forerunner of the convulsive state, is probably the result of the crossing of these somatic stimuli into the sensory tracts. Not infrequently labor is ushered in. Each of these features may be attributed to the hyperstimulation of the sympathetic nerve system. (Headaches will be dealt with in greater detail a little later.)

We often find that when a patient in this hypersensitive pre-eclamptic state receives external stimulation such as is necessary in bringing the patient to the hospital, or in examining her on admission, or in the necessary handling in the process of getting treatment started, this external stimulation is enough to overload the synapse threshold and a convulsion results.

During the process the end result of which is marked by this well-known cataclysm of nerve stimuli, the convulsive state, there has been in most cases the gradual rise of blood pressure. As has been suggested this sign is the result of an increased tone in the smooth muscles surrounding the arterioles and their capillaries due to hyperstimulation of the sympathetic nerve system. It is generally conceded that this process is one of Nature's protective processes resulting in increased elimination. Under normal conditions the reserve power of the eliminative system is sufficient to handle the situation. As long as metabolic equilibrium is maintained, all goes well. Should, however, the detoxifying function of the liver or the function of the kidney be sufficiently injured or reduced by a bacterial embolus or emboli, then the system is forced to call upon the increase of blood pressure to bring about the required increase in rate of elimination. All goes well in the case as long as the increase in blood pressure competes with the increased demand for elimination. Many cases present this sign of toxemia of pregnancy alone. It is my conception

that these cases represent the successful attempt on the part of the system to cope with the demand.

As soon as the kidney begins to show albumen in the urine however we have evidence of a profound disturbance of the kidney as an organ of elimination. Disturbance in elimination may be present long before albumen is found in the urine but this sign is a positive sign of danger regardless of the height of blood pressure.

Disturbance of the eliminating functions of the body is of the most serious import in such a situation as it necessitates a further strain or readjustment of the whole system. Retention of waste products must interfere with proper metabolic interchanges and retention of water increases the bulk of the blood stream.

The increase in the bulk of the blood stream by the retention of water necessitates a dilatation of the whole blood system. As the process progresses we have an increasing force applied from within the arterioles counteracting the stimuli from the sympathetic nerves which are endeavoring to contract the arterioles to raise the blood pressure and thus increase elimination. Gradually through the actions of these opposing forces a state of fatigue in the smooth muscle coats of the arterioles results which takes place first in those dependent portions of the body where the strain is the greatest. Edema or the passage of an excess of fluid to the tissues through the thinned out dilated capillaries is the result. Pressure edema or cardiac edema falls readily into this conception.

Edema may also come in localized regions from paralysis or partial failure of nerve function due to other causes, such as the action of the toxins of bacteria on the sympathetic nerve fibers themselves. Witness the paralysis of the intestine in association with general peritonitis.

In general severe acute infections have a lowered blood pressure as a rule. It is probable that the lowering of the blood pressure under this condition is due to this relative inefficiency or partial paralysis of the sympathetic nerve fibers in control of the peripheral circulation resulting from the severity of the acute infective process or the action of bacterial toxins on the sympathetic nerve fibers.

This conception of the cause of edema, is, I believe, supported by well-known phenomenon in arteriosclerotic type of chronic nephritis. Edema is much more rare in this type of case than in the earlier parenchymous type of chronic nephritis. If we recognize the fact that the arteriosclerotic process involves the peripheral circulatory capillaries as well as the larger vessels, it will be seen that their elasticity has been at least partially lost and although the blood pressure may attain considerable elevation through the reflex call on the heart for greater elimination, yet these calcified arterioles do not dilate to allow the diffusion of fluid to pass into the tissues. Fracture of these

arterioles from internal pressure is a feature of this type of chronic nephritis.

Undoubtedly the local paralyzing effect of the toxins of bacterial activity plays an important rôle in the disturbance of function of those organs attacked by the minute bacterial emboli which we have seen are passing here and there in the body. Localized edema is present in nearly all acute infective processes. Edema of the brain so frequently found in the dead eclamptic may be due to either the passive or the active causes described but in this connection it is important to bear in mind the statement by Kosmak that hemorrhagic lesions in the brain have been noted in most autopsies on eclamptic subjects. These lesions represent the invasion of the brain tissue by the bacterial emboli. The edema may well be due to the toxins coming from these foci.

It has been hoped by many that the amount of retained nitrogen in the blood stream would give a measure of the toxemia present. Examinations of the blood of toxic and eclamptic patients have shown that this hope has failed. In general however most investigators have shown that there is some degree of retention in this class of cases. This finding is consistent with the conception of the disease process which I have advanced. This retention of waste products is not in itself the cause of the phenomena of the disease but is merely an associated phenomenon. The real cause of the disease is the disturbance of balance of the functions of the many organs involved, reflected through the hyperstimulation of the sympathetic system to correct this disturbance. Thus, disturbance of the functions of such an important organ as the liver may precipitate eclampsia before sufficient time has elapsed for retention to take place.

Postpartum eclampsia is the most difficult feature to fit into most of the other theories of the cause of this disease. It has been this feature that has convinced me that the cause of the disease is not to be found in the products of pregnancy. If we apply the principle above stated that convulsions are the result of hyperstimulation of the sympathetic nerve system due to derangement of the metabolic functions resulting from the spotting of bacterial emboli through the different organs, it will be seen that the absence of such a feature as postpartum convulsions in this conception of the disease would carry serious doubt as to the validity of the theory advanced.

Not only is it reasonable that a shower of emboli might come from an area of chronic sepsis during or just after labor but also there is a much more potent factor to cause a shower of emboli during or just after labor. If for instance there are several foci of virulent infection in the placental site, (beginning infarcts) just before labor begins, the contractions of the uterus are all that is necessary to spread such infection into the blood stream of the mother plus the trauma to the placental site resulting from the detachment of the

placenta. Thus the infection of the placental site may act as a secondary focus in such a case, and it is probable that it does so act in other situations during the pregnancy.

There is much evidence available that there are numerous cases of vomiting of pregnancy which are dependent on the activity of foci of infection. The pathology of those cases which die show a similarity in the focal lesions in both liver and kidneys. De Lee⁶ speaks of a "diffuse hemorrhagic hepatitis and extensive areas of necrosis." Also that "the kidney suffers all the changes from those of the so-called kidney of pregnancy to an acute parenchymatous nephritis." "*Hemorrhages* are often found." "The heart undergoes fatty degeneration in the bad cases, as in *sepsis*." Clinically there is this to be said. Many cases cease to vomit after foci of infection have been removed. This has been borne out not only in my own experience but by the experience of Loomis⁷ of California and Rowley⁸ of the Mayo Clinic. Some very startling cases have passed under my observation. It has also been true in my experience that those cases which presented no foci of chronic sepsis have in each case been free from any vomiting. It is also true that many cases which have foci of chronic sepsis go along without any vomiting, toxemia or other pathology but I believe it will be granted by all open minded readers that this evidence does not invalidate the theory advanced.

The recent work which has shown that the glycogen content of the liver is much reduced in toxemia of pregnancy and eclampsia is entirely consistent with this conception of the processes involved in producing the disease.

Kendall⁹ in his book on bacteriology states that pathogenic bacteria, if given an opportunity of choice between carbohydrate food and protein food, will universally attack the carbohydrate food first. A similar early utilization of carbohydrate stored energy is apparent in the metabolism of the human body. He also points out that the toxins of these pathogenic bacteria are much less virulent when they are fed upon carbohydrates. I believe the application of these two general principles will explain the findings that the liver is impoverished of its glycogen content in toxemia of pregnancy.

As a fundamental feature there must be a rapidly increasing demand on the part of the growing fetus for the simpler forms of carbohydrate food. In toxemia of pregnancy we have in addition a systemic attack by bacteria. The virulence of these bacteria can be modified if the body fluids can be enriched by carbohydrates. Therefore the system increases its call upon the store of glycogen in the body. It is, I believe, an accepted finding that the percentage of blood sugar is slightly above normal in the presence of most acute infections. Consider this process in the light that we have, which shows that the liver itself is limited in its functions of producing and storing glyco-

gen by the direct attack of these bacteria. The end result is found in the reduction of glycogen in the liver brought about by the increased demand of the pregnancy plus the systemic infection and the interference with the reproductive process by damage to the liver. It is the extra load or demand which the pregnancy exerts in this situation which precipitates symptoms which do not appear in other infections. Thus the feeding of the simpler types of sugars is of assistance in the battle against this disease process.

Many cases of toxemia respond to eliminative treatment and more do not. It is my impression that eliminative treatment merely holds the process in check by relieving one portion of the load. By stimulating activity in the smooth muscles of the intestine the condition of spasticity and resulting constipation is relieved. The demand to bring about sufficient elimination to re-establish equilibrium in the body is the source of the great stress on the sympathetic nerve system and this stress is reflected by the rise in blood pressure. Elimination by the bowels and the kidneys reduces this strain and its indicator, the blood pressure falls. The cause of the disease is however still present and gradually the symptoms return unless the pregnancy is terminated by natural or artificial means.

The beneficial results obtained from the use of morphine in this disease are easily explained by this conception of the hyperstimulation of the sympathetic nerve system. The action of morphine on the sympathetic nerve system is plain. It checks the bowels, slows and often stops labor and checks the secretion of glands. This evidence shows its effect on the somatic nerve system. Veratrum acts similarly, only more powerfully, applying its paralyzing action to the sympathetic nerve endings in connection with smooth muscle. The blood pressure is reduced by dilatation of the peripheral circulation which in turn reduces the pulse rate by reducing the work on the heart. The effect of these two drugs tends to relieve the strain on the sympathetic nerve system but as the effect of the drug cannot be controlled or tempered, the treatment may undo nature's protective process for increased elimination by the kidneys. Both of these drugs have important use in preventing convulsions but, as they tend to impede Nature's process of defence, they should not be used except in extreme conditions and over a relatively short time.

Blood-letting by reducing the volume in the blood vessels temporarily reduces the blood pressure. The removal of this amount of force from within the arterioles reduces the amount of required stimulation of the smooth muscle coats to counteract this force. Thus a reduction in the total stimulation upon the sympathetic system as a whole is brought about. A valuable amount of elimination is also accomplished.

Many of the symptoms associated with toxemia may be attributed

to the proximity of the foci of infection themselves. Neuralgias of all sorts are common but the great majority are in the head and neck.

Headache is a very common and very important symptom in this disease. A discriminating study of this symptom shows however that there are many kinds of headache. The one-sided headache is generally neuralgic in type and due to the activity of some focus of chronic sepsis on the same side of the head. As warnings of approaching convulsions they are seldom of any significance. As a leader in the search for chronic infection, they are of the utmost importance as they generally indicate the side of the head where the active focus lies.

The generalized, throbbing, severe type of headache is most often associated with the severer grades of toxemia and is often a forerunner of the convulsive state. They may be interpreted as due to an increase in intracranial pressure due either to high blood pressure or edema of the brain with which they are frequently associated.

There is a third type of headache which may be termed occipital. This type is often associated with stiffness in the muscles of the neck. Not infrequently the stiffness of the muscles is unassociated with headache and is described as a drawing sensation.

This type of headache is, I believe, the most reliable symptom of the presence of chronic sepsis in the teeth or tonsils which we have. Its reliability is of equal value whether the patient is pregnant or not. I speak thus positively because in my experience this symptom has been repeatedly cured by the removal of all foci of infection. It is an extremely common symptom and I have never seen it fail as a leader in dealing with the problem of the presence or absence of foci of infection in the head. An explanation of the mechanism of its production is given in one of my recent papers.

Just as in appendicitis the pain which is felt is a referred pain, so in the head the neuralgia, the one-sided headache and the occipital headache is a referred pain. In both cases the primary stimulation of the nervous system is through the sympathetic fibers adjacent to the infection. The synapse in the former case is probably in the cord, in the latter case it is probably in one of the many ganglia associated with this region.

Is it not possible that the picture which the placenta displays to us, showing the presence of multiple and repeated emboli of bacteria in the blood stream of the pregnant woman during the nine months of its existence, is in reality the method of the systemic attack which results from all foci of chronic infection? Given the point of entrance within the tissues, the damage to the organ or organs which are attacked depends upon, first, the chance that the emboli of bacteria gain entrance to the tissues of the organ, second, that the bacteria have the ability to utilize this particular tissue as food for its con-

tinued life. It is very evident that certain bacteria grow more readily in some tissues than in others. Thus the pneumococcus finds proper food material in the lungs, the diphtheria bacilli in the throat. Typhoid bacilli, although present in the form of a bacteriemia at first, find Peyer's patches and the spleen their most suitable feeding places. Other kinds of bacteria have a wider range of tissues in which to find suitable food but all are subject to one general principle, the resistance of the tissues involved or the power of self-preservation as between one kind of cell which is antagonistic to the life of the other.

Cytolysis adjacent to the invading bacteria is one of the primary events resulting from the invasion of a tissue by the bacteria. This process may be slow or rapid according to the kind and virulence of the bacteria involved. When rapid, may it not be that this cytolytic process causes the minute hemorrhagic lesion by rupturing the adjacent capillaries? Nature's answer to such an attack is through its power to thrombose the blood at the point of rupture of the blood vessel. The cutting off of the blood supply locally by the thrombosis leads eventually to the small areas of necrosis distal to the infective lesion. The effect on the system is shown only when this process is wide spread and damaging enough to reduce the function of the injured organ or organs and thus to disarrange the balance between the many organs of metabolism.

It is the conception of the writer that the processes involved in the production of the disease of toxemia of pregnancy are the same processes which are involved in the production of all infectious diseases. In pregnancy we have a condition in which the potential power of the whole metabolic system is placed on a strain. Under this strain derangement of the necessary balance between the organs of metabolism is more readily reflected and we find symptoms which are more commonly found only in the late results of more chronic disease processes such as chronic nephritis. An acute general infection such as a pneumonia in the presence of a pregnancy does not produce the symptoms of toxemia of pregnancy because its effects on the system are not brought about by the spotting of bacterial emboli so much as by a toxemia which is sufficiently severe and general to partially inhibit or paralyze the sympathetic nerve system as a whole.

In conclusion the author wishes to point out that the principles involved in the foregoing conception of the cause of toxemia of pregnancy are sufficiently broad to embrace the many different types of toxemia which are apparent in the disease and yet are sufficiently specific to explain those variations. In the many different theories which have been advanced each author has advanced his theory based on the preponderance of evidence which was apparent in his

series of cases. Thus the kidney theory has been qualified by the liver theory. Intestinal auto-intoxication has been thought to be the cause. Disturbed metabolism has had many devotees. Because of the frequent association of pathology in the products of the pregnancy the cause of the disease is believed by many to come from the fetus or the placenta. None of these explanations has been broad enough to account for all cases. It is the belief of the author that the preceding conception shows how the kidney or the liver may be the most prominent feature of the case. It shows why constipation is usually associated with the disease. Disturbed metabolism, although not always apparent in the blood chemistry, is reflected in the hyperstimulation of the sympathetic nerve system. The pathology of the products of conception is explained as damage resulting from hematogenous infection of the placental site. It shows that Young's theory which lays the cause to the products of infarct formation is true only in the sense that the acute infarct may act as a secondary focus for the spread of infection and may be contemporaneous in its origin to the damage of similar nature in other organs of the body, this latter damage being the true cause of the symptoms of the disease.

It is further emphasized that the fundamental principles upon which this conception is based are equally applicable to other infectious complexes.

REFERENCES

- (1) *Talbot, J. E.*: Surg., Gynec. and Obstet., June, 1921, p. 552-556. Surg. Gynec. and Obstet., July, 1922, p. 42-49. August, p. 187-197. Boston Med. and Surg. Jour., August 31, 1922, clxxxvii, No. 9, p. 315-318. (2) *Cannon, W. B.*: Jour. Am. Med. Assn., July 8, 1922, lxxix, No. 2. (3) *Kosmak, G. W.*: Toxemias of Pregnancy, Gynecological and Obstetrical Monographs, Appleton & Co., New York, 1921. (4) *Kellogg, F. S.*: AM. JOUR. OBST. AND GYNEC., April, 1922, iii, No. 4. (5) *Brown, Langdon*: The Sympathetic Nerve System in Disease, p. 24. (6) *DeLee, J. B.*: Principles and Practice of Obstetrics, p. 358-359. (7) *Loomis, F. C.*: California State Jour. of Med., Nov., 1919, xvii, No. 11. (8) *Rowley, W. N.*: The Management of Teeth during Pregnancy, Read before the Southern Minnesota Medical Association, Dec., 1921. (9) *Kendall, A. I.*: Bacteriology, General, Pathological, Intestinal.

THE INDICATIONS FOR AND THE VALUE OF TUBAL PATENCY TESTS IN THE STUDY OF STERILITY*

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THERE seems to be a definite need, and the time seems appropriate, to appraise the value of tubal patency tests in the study of sterility.

Such an appraisal involves a consideration of the indications for testing the patency of the fallopian tubes. It includes also a study of the importance such tests may be accorded as demonstrating the ability of the tube to provide a union of spermatazon and ovum. It includes also the enumeration of the contraindications. Under the latter heading we must elaborate the important question if there be not instances when for sociologic and domestic reasons it may be unwise to carry our investigation to a definite proof of damaged tubes.

It was my pleasure to present in 1914,¹ for the first time I believe, a plan and technic of studying tubal patency by demonstrating by x-ray the escape into the abdominal cavity of a registering fluid injected by the transuterine route. The value of the procedure was at once recognized and taken up by others, and case reports and x-ray pictures followed. I regret to say that recognition of the source from which the idea emanated was not always clear. I have not alluded to this previously in a formal way for I have the greatest distaste for discussions of priority. It is not important, and the facts are definitely established in medical literature. While others were elaborating and materially modifying and improving† the technic, with other names taking prominence until the child would not have recognized its own father, I had already begun to seek a simpler and cheaper method for testing tubal patency. This, in a measure, answers the criticism which has been made because of my failure to report cases, etc., in my first paper. In further explanation, one must remember, that as early as 1914 x-ray technic lacked much of its present development. The institution with which I was affiliated had insufficient apparatus or money to carry out this experimental work. The patients whom we studied were taken to a private laboratory, and unfortunately I did not have the finances to continue this expensive work. While others rapidly developed this original principle, I abandoned experimental work along these lines and, as stated above, developed a much more simple method and one of equal accuracy, though of less definite demonstration. This method² I presented in a paper on sterility

*Read at a Meeting of the Section on Obstetrics and Gynecology of the New York Academy of Medicine, May 22, 1923.

†Notably the excellent work of Rubin.

diagnosis in 1921 before the New York Obstetrical Society. I did, however, hope for, and would have welcomed sterility cases, justifying the expense of tube study, but I was interested to find that as I studied my sterility cases more thoroughly the need of patency study proportionately diminished. I have never deviated from a principle then enunciated that the indications for studying tubal patency will diminish in ratio to the completeness with which the sterility problems are otherwise studied.

I wish to emphasize that I am interested in the general study of sterility, and consider it one of the most difficult and important branches of medical work, and I resent any impression that the question of fertility is solved by one's ability to force some substance through the tubes. I wish to reiterate that investigating the patency of the tubes by any of the tests is a very small part indeed of the work one must be prepared to do in studying sterility. I would further emphasize that I have found that tube patency tests are very rarely necessary but when indicated they are, of course, of the utmost value.

If my observations are correct, we may define the indications for studying tubal patency as follows: *When by competent study, the fertility of the male is established and by the insemination test successful migration of spermatozoa to the fundus of the uterus is demonstrated, thus fixing responsibility upon the adnexa by a process of exclusion, the patency of the tubes should be tested, if a blockade of these structures is not already reasonably established by reason of a history of inflammation with confirmatory findings upon bimanual examination.*

Now let us analyze this rule for indications. I think it is generally granted that 50 per cent of the sterility cases coming for study will prove to be of male origin. A small number will show gross pathology definitely explanatory. A very small percentage will be due to destructive chemistry in the vagina, while a much larger number will be shown by the insemination test to have mucus blockade in a chronically diseased or hypersecreting cervix. When, however, all these possibilities are eliminated, the adnexa will be found responsible in a relatively larger number of cases. In my experience, it is surprising how few of these cases require a patency test for diagnosis. Induced abortion with long convalescence in early marriage, a husband acknowledging an uncured or improperly treated Neisser infection, a history of appendicitis with abscess or peritonitis, an earlier curetting with subsequent morbidity, are found lurking in almost every history. With this acknowledged it is surprising how to trained hands the tell-tale findings on bimanual examination complete the diagnosis. A fixation of the ovary, a cervix held up to one side, a tube fixed in the culdesac, or a fixation of soft tissues make the story of tube in-

efficiency definite. Why with a history of years of sterility, definitely shown by elimination to be adnexal, and with the above findings anyone should hesitate to make a diagnosis I cannot understand. Are we going to lose faith in our bimanual examinations just because we have a new technic? I make such diagnoses repeatedly and I tell these patients to put their trust in time, menstrual rest and perfect hygiene, including prevention against reinfection. A laparotomy solely to correct sterility is, in my opinion, rarely justified. I do not expect these patients to accept operative intervention after I have given them an honest statement of the small percentage of successful results. My prognosis is discouraging but not hopeless, and it would not be materially altered just because I succeeded in forcing gas or fluid through the tubes by high pressure. With grosser pathology there could be no excuse for the expense, aside from the possible risk of investigating the tubes. A few cases remain when neither the history nor the

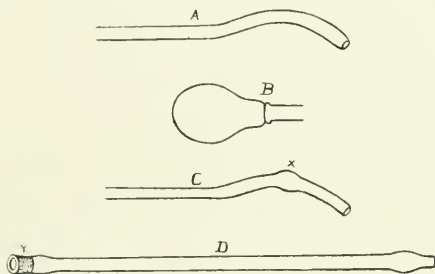


Fig. 1.—Perfected details in technic and equipment are necessary. (A) A ten inch pipette (16 F to 18 F) with Skene tip is the standard. (B) Rubber bulb must fit absolutely air tight. Any leak destroys accuracy of test. (C) Another modification of pipette by author, the expanded bulb (x) one inch from the tip assuring absolute fit in the more patulous cervical canal. (D) Pipette made for author with Luer syringe connection (y) for cleansing tenacious mucus from cervical canal before making saline test. A quick and painless method for cleansing the canal in treating endocervicitis. (Pipettes made by Tiemann & Co.)

dexterity of the examining hand can reveal sealing of the tubes. In these cases the patency tests are of the greatest help. Closed tubes are encountered where no suspicion points. For these examinations my simple pipette (Fig. 1) and saline method, gentle, painless and easily executed, gives me increasing satisfaction. It is surprising how, with practice, the tips of one's fingers on the rubber bulb learn to measure resistance. I believe the less force used the more accurate the knowledge gained as to function. I am not sure that patency in a physical sense constitutes functional patency, and one should be most modest and careful in his conclusions.

Under the heading of indications the treatment of tubal occlusion by injection or inflation may possibly be in order. One's imagination

readily conceives of a tube lightly sealed that could be opened by such technic. I have had reason to think that I accomplished this result with saline injection on three occasions. Such results are not subject to proof. These experiences occurred while the usual diagnostic technic was taking place. If I cared to utilize greater pressure, such experiences might be more frequent. Greater pressure, however, I believe certainly diminishes the value of the technic as a diagnostic measure, for one is seeking to explain the relation of the tube to the failure of impregnation. My impression that tubes open under pressure was gained by accidental occurrences, and are not observations made while injection was done as a means of treatment. In a previous paper I suggested that such technic offered a possible therapeutic measure but I have had insufficient experience to make any report. I have no series of cases. Conscientious adherence to the principle which I have already stated limits one to a few cases. I am working at present on a patient with an absolute sterility of seven years, with all other conditions for pregnancy perfect except sealed tubes, doubtless due to an appendicitis with abscess which occurred the year of established puberty. The process has now been quiescent for thirteen years. My tendency is to select one case of proper indications and study it as intensively as possible. The results of such study may not be spectacular, but the information obtained is of real value. In this case I have injected the tubes only once a month after the cessation of the period and before coitus has occurred, thus escaping any possibility of interrupting a pregnancy. This latter possibility is one that must be kept in mind. Wholesale use of this technic will certainly produce some early abortions—a veritable calamity in this class of cases. Ectopic pregnancy is another possibility. I have charged myself with one. The patient referred to above has accepted this risk, frankly explained. Extreme conservatism is felt by the writer, and attempting to open damaged fallopian tubes by pressure exerted through the uterine route should be restricted to expert workers.

Another indication is emphasized by Stone who states that he has for some years used transuterine injection of fluids before laparotomy in certain cases to demonstrate the condition of the tubes.

CONTRAINDICATIONS

A detailed consideration of the contraindications is not necessary, for the negative phase of our subject is defined by restrictions outlined in our definition of indications. Cases with infection of the cervix, definite adnexal inflammatory lesions, etc., are at once excluded.

There is, however, a very small class of patients where the surgical indications may be quite satisfactory but for whom we may, for soci-

ologic reasons, hesitate to utilize all our methods of diagnosis. Genito-urinary specialists learn to recognize a type of patient to whom they do not make a hopeless prognosis of sterility. Depression, mental unbalance and suicide have followed a casual hopeless prognosis. The most satisfactory domestic relation may be strained to the utmost by the consideration of fertility. Every gynecologist will also encounter patients where a definite diagnosis of tube blockade will not be practicable. One of the modern products is a woman informed, but not too well, on social diseases who interprets disease of the tubes as evidence of hopeless sterility. Furthermore, there is the conviction, often aggravated by the physician's denial of the responsibility being the husband's. I avoid or cautiously proceed with diagnostic measures when I feel I am handling a patient of this type, the one of strong maternal instinct, on trouble bent, seeking the cause of her childlessness. A bitter and depressed patient, ill-disposed toward her husband and home, is not a happy ending to a scientific triumph. This hint is applicable to the whole question of sterility.

In conclusion, I would reiterate that I am interested in the whole subject of sterility, a subject of infinite scope. Evolution is constantly in progress. The biologist and scientist are presenting new and pertinent facts daily. If cell activity is due to electron unbalance, who can measure the influence yet unknown? Men with big clinics will ultimately call associates in kindred sciences to aid in sterility study, and here I predict will be one of the great future advances in medicine. I have recited the early history of tubal patency work to show that if my opinion of the importance of tubal patency tests to the subject of sterility seems overly conservative and is ultimately shown to be ill-founded, it will at least carry the evidence of sincerity.

REFERENCES

- (1) Note on Determination of Patency of Fallopian Tubes by the use of Collargol and X-ray shadow. *Am. Jour. Obst.*, 1914, lxi, No. 3. (2) Sterility Studies. Simplified Methods in Diagnosis. *AM. JOUR. OBST. & GYN.*, 1921, ii, No. 4.

36 PIERREPONT STREET.

THE PHYSIOLOGICAL LOSS OF WEIGHT IN THE NEWBORN AND ITS CONTROL*

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THE physiological loss of weight occurring in the newborn was first accurately described by Chaussier¹ in the latter part of the 18th century. Quetelet, in 1838 confirmed his observations and was the first to chart the weight curve of a normal breast fed infant.

In the thousands of statistics available, it is the exception to find that this loss of weight does not occur.² Its symptomless progress, and the prompt return to the initial weight when sufficient and proper nourishment is assimilated, justifies the assumption that this phenomenon is a physiological one.

The weight loss as reported by many authorities is approximately 6 ounces in the first 24 hours. This is an average and the limits range between 1 ounce and 20 ounces. During the second 24 hours the average loss is less, about 4 ounces, while during the third 24 hours, there is very little loss or the weight becomes stationary. These weight changes, particularly after the first 24 hours, are dependent chiefly on the amount and character of nourishment which the child obtains, all other factors which tend to inhibit the assimilation of nourishment, chilling, illness, and anatomical defects, being absent.

The physiological loss of weight occurs because the infant excretes more than it assimilates.³ The amount of meconium averages about 3 ounces.⁴ Urine is passed during the first day, although no fluid may be taken by mouth. The amount of urine excreted is mostly dependent upon the relative and absolute water content of the body.⁵

The amount of urine passed during the first 24 hours is about one-half ounce, one and one-half ounces in the second day, and about 3 ounces in the third day.⁶

It has been frequently observed that the newborn infant does not pass urine during the first day. This occurs in about one-third of all newborns.⁷ This anuria is to be considered without clinical significance, and is due to the low water content of the tissues, and the starvation to which the infant is subjected in the first day of life.

Among the other channels by which weight loss occurs and of far greater importance is the loss due to the dehydration of the tissues. The loss occurs by way of the skin and lungs.⁸

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Von Reuss³ very aptly describes the picture of the infant after this dehydration has occurred. "It is only necessary to examine the newborn child during the period of losing weight to perceive that a loss in the body substances which are derived from the fetal period is not all that takes place. The postpartum tightness of the infantile skin changes * * * so that it becomes flabby and wrinkled." In reality there is a loss of water causing a distinct lessening in volume of the deeper tissues.

The body of the newborn infant is rich in water. It comprises about 70 per cent of the entire weight.⁹

By way of the skin most of the water is lost in the form of what is known as insensible perspiration. The sweat glands do not function in early infancy, and the observations of Loewy¹⁰ have shown that the insensible perspiration is independent of the sweat glands. The work of Soderstrom and DuBois,¹¹ Sauer and McClure,¹² Benedict, Atwater¹³ and others give definite data as to the importance of the insensible perspiration as an avenue of escape for water from the tissues. These observations, however, were confined entirely to adults.

Changes in the serum protein percentage indicating changes in the plasma water,^{14, 15, 16} show that as the concentration of serum protein reaches its highest point, the weight loss will have reached its lowest level. As the weight increases there is, in most instances, a fall in concentration of serum protein. In certain instances¹⁶ there may be no change in the water content of the plasma due probably to a large water reserve at birth.

In a study of the respiratory water loss during the period of physiological weight loss,¹⁷ it was shown that during the first 12 hours with no food intake, there was a respiratory water loss twice as large as the loss sustained by the excretion of urine and meconium. During the second day the child was fed weak milk mixtures entirely inadequate in strength and amount to meet the caloric requirements of the child, nevertheless the respiratory water loss became 5 times as great as the loss by urine and meconium.

These experiments were confined entirely to the estimation of water loss by respiration, and the amount of loss sustained by evaporation from the skin of the newborn has yet to be determined.

The amount of water in the tissues is in direct proportion to the absolute body weight. In those infants weighing less than 5 lbs. at birth, the relative loss is 8.9 per cent of the initial weight. Infants weighing 6-7 lbs. lose about 7 per cent, 7-8 lbs. lose 6 per cent, and those weighing over 8 lbs. lose 5 per cent and less.

The absolute loss of weight in the large child of 8 lbs. and over is usually much greater than that sustained by the smaller infant. In the statistics of Dluski¹⁸ there is shown a loss of 150 gm. in those

infants weighing 1500-2000 gm. and a relative loss of 8 per cent. Infants of 4000-4500 gm. lost averagely 270 gm. and a percentage loss of 6.

There is no proof to show that the tissues of the larger child contain a greater amount of water than is found in the smaller infant. Nevertheless we can assume that this is true by the above, and by our own observations. The larger child sustained in all instances, a greater loss, there being no intake of fluid during the interval of observation.

The large child will regain its initial weight more rapidly. This is due to the fact that usually a multipara will give birth to a larger child, and will have a better and more rapid secretion of breast milk. Further, it is reasonable to assume that in the small infant there is a certain degree of feebleness when compared to the robust child of greater weight. It is not to be assumed that the energy of an infant is dependent upon its weight, but the infant of 5 lbs. and less will show a degree of muscular inertia, and its ability to nurse will be correspondingly feeble.

It is the custom of some to place the infant to the breast directly after birth, and in some instances to complement the breast feedings by weak milk mixtures, whey, lactose solutions or large amounts of colostrum.¹⁹ Sadowfsky and Gundobin³ by placing children to the breast 12 times in the first 24 hours, and later 2 hour interval feedings by day and 4 hour interval feedings at night, were able to record a loss of only 5.6 per cent. This percentage indicates the total loss occurring during the entire period of physiological weight loss.

By any of these methods the weight loss may be balanced by as great an intake of fluid as is lost so that the loss may be done away with entirely. Experience has taught us that the natural feebleness of digestion is entirely inadequate to cope with most types of food other than breast milk, and a weak breast milk comparing its component parts to that obtained after the infant has nursed at the breast for several weeks.

In the endeavor to control or modify the loss other than by any of the above methods, efforts were directed towards lessening the loss of water from the tissues without influencing the supply.

Under ordinary conditions, directly after birth, the infant is subjected to a temperature change amounting to 30° F., the difference between the temperature in the uterus of the mother, 99° F. and that of the lying-in room about 70° F. The chilling which is resultant upon this fall in temperature is further augmented by evaporation of the vernix caseosa, and the usual habit of placing the infant upon towels saturated in a mixture of blood and amniotic fluid.

The infant remains in these surroundings for about ten minutes.

Accurate stop watch observations were made at a large obstetrical service (the accoucheur not being aware that the time interval was being determined) and it was found that rarely was the interval shorter than ten minutes before the infant was finally placed in blankets.

To obviate this chilling, electric heating lamps were used. They were so placed that when held at a distance of 20 inches from the vulva of the mother, the infant would be born into an atmosphere of 99° F. The heat was maintained throughout the time the infant was allowed to remain upon the delivery table. The initial cry appeared to be just as lusty in those children who were exposed to heat as that of the infants whose skin received the usual chilling.

It was found that infants protected by heat sustained a lessened weight loss. As other important factors beyond our control modify the weight thereafter, the loss of weight during the first 24 hours alone was considered.

TABLE I

WEIGHT	NUMBER	AVERAGE WEIGHT	AVER. ACTUAL LOSS	% LOSS
8-9 lbs.	32	8 lbs. 9 ounces	5 ounces	3.6%
7-8 lbs.	47	7 lbs. 8 ounces	4.4 ounces	3.6%
6-7 lbs.	41	6 lbs. 6 ounces	3.5 ounces	3.4%
5-6 lbs.	42	5 lbs. 10 ounces	2.1 ounces	2.3%
3-5 lbs.	7	4 lbs. 5 ounces	2 ounces	2.9%
Average	169	6 lbs. 8 ounces	3.4 ounces	3.2%

The weight loss observed in many infants in two²⁰ large institutions having active obstetrical services was used as a basis of comparison.

TABLE II

WEIGHT	NUMBER	AVERAGE WEIGHT	AVER. ACTUAL LOSS	% LOSS
8-9 lbs.	34	8 lbs. 4 ounces	5.3 ounces	4%
7-8 lbs.	34	7 lbs. 4 ounces	5.8 ounces	5%
6-7 lbs.	30	6 lbs. 6 ounces	4.1 ounces	4%
5-6 lbs.	10	5 lbs. 7 ounces	3 ounces	3.4%
3-5 lbs.	16	3 lbs. 15 ounces	5.1 ounces	8%
Average	124	6 lbs. 4 ounces	4.6 ounces	4.6%

The unusually high percentage loss in infants weighing under 5 pounds in Table II, is similar to that found in the statistics of Dluski, Heidemann, Trepper, Héry, and Jaschke.¹

Observations made of the rectal temperature changes occurring during the first ten minutes of life, showed an average drop of 1.1 degrees in 48 infants exposed to heat during this interval. A drop of 1.8 degrees was recorded in 40 infants not so protected.

No relationship was shown between the loss of weight and the

temperature change. One infant exposed to heat lost 12 ounces in 24 hours with a fall in temperature during 10 minutes of 2.4° F. Among the infants born under ordinary conditions, there was recorded a loss of 15 ounces, and a temperature change of 3° F.

DISCUSSION

Rowntree²¹ has shown that the higher the environment temperature the greater the water loss by evaporation from the skin. The capacity of air for holding water vapor increases with the rise in temperature.

Rubner²² considers the humidity of the air as an important factor. Animals give off more water vapor in dry than in moist air, the temperature being constant, an increase of 200-300 per cent accompanying a decrease of relative humidity from 69 to 31 per cent.

As the losses recorded by Rowntree and Rubner occurred only during the time of exposure, the loss of weight occurring in the infant during the ten minute exposure to either or both conditions would be comparatively insignificant.

Observations have not been made in infants to determine the effect of temperature and humidity on the respiratory water vapor loss or the loss by insensible perspiration, or whether the chilling of the skin to which the newborn infant is usually subjected would cause a subsequent and continued increase in loss through these channels due to an increase in the metabolic rate. Further studies will be undertaken to determine the influence of chilling on the water vapor loss. In the absence of definite data, any explanation of the changes recorded would have to be purely hypothetical.

COMMENT

In most newborn infants the loss of weight occurring after birth may be viewed with equanimity.

In those very small infants, particularly the prematures, the physician is often in difficulties to overcome the physiological loss which may assume proportions great enough to jeopardize life. Avoidance of the chilling to which most infants are exposed has been followed by an appreciable lessening of the loss. Maintaining the body surface temperature throughout the first day of life in conjunction with proper amounts of fluid by mouth may conceivably avoid the loss entirely.

CONCLUSION

The loss of weight occurring during the first days of life is a physiological process.

Most infants directly after birth are exposed to temperature changes amounting to a fall of 30 degrees.

In 169 infants in whom this chilling was avoided there was an actual loss in the first 24 hours of averagely 3.4 ounces and a relative average loss of 3.2 per cent.

In 124 infants who were exposed to this temperature change, there was an actual average loss of 4.6 ounces and a relative average loss of 4.6 per cent.

The loss of weight in those infants who were used as controls (not being exposed to heat) was 43.7 per cent more than the loss sustained by those so exposed.

I wish to express my indebtedness to Dr. G. L. Brodhead for the privilege of allowing this study to be made, Dr. William Studdiford for the use of the records at Sloane Maternity Hospital, and to Mrs. James Guttman for her technical assistance.

REFERENCES

- (1) *von Jaschke*: Rud. Th. Physiol. Pflege u. Ernährung des Neugebor., page 144, Wiesbaden, 1917. (2) *Pies, W.*: Ueber die Dauer, die Grösse u. den Verlauf d. physiol. Abnahme d. Neugebor., Monatsschr. f. Kinderheilk., 9, 1911, 514. (3) *von Reuss, A. G.*: The Diseases of the Newborn, Wm. Wood & Co., New York, 1921. (4) *Cameron, W.*: Beitrag zur Physiol. des Säuglingsalters, Zeitschr. f. Biol., 39, 1900, 37. (5) *Browning, H., und Schwalbe, E.*: Handbuch der Allgemein. Pathol. des Kindesalters, Wiesbaden, 1914. (6) *Reusing*: Beitrag. z. Physiol. d. Neugebor., Zeitschr. f. Geb. u. Gyn., 33, 1895, 36. (7) *Kotcharowsky, quoted by Gundobin, A. P.*: Die Besonderheiten d. Kindesalters, 592, Berlin, 1912. (8) *Finkelstein, H.*: Lehrbuch d. Säuglingsk., Berlin, 1921. (9) *Cameron, W.*: Die chemische Zusammensetzung d. Neugebor., Zeitschr. f. Biol., 38, and 40. (10) *Locvy*: Biochem. Ztschr., 1914, lxxvii, 243. (11) *Soderstrom, G. F., and DuBois, E. F.*: Arch. Int. Med., May 1917, Part 2, Vol. xix. (12) *Sauer and McClure*: Arch. Int. Med., 1918, xxi, 429. (13) *Atwater, W. O. Benedict, F. G.*: U. S. Dept. of Agricul., Bull. 136, 1903, pp. 95 and 134. (14) *Kott, F.*: Beitrag. z. Wesenerklärung d. physiol. Gewichtsabnahme. Zeitschr. f. Kinderheil., 4, 1910. (15) *Rasz, E.*: Die physiol. Schwankg. d. Refractomet. u. Viskos. d. Säuglingsblutes. Monatsschr. d. Kinderheil., 10, 360, 1912. (16) *Bakwin, H.*: Amer. Jour. Dis. of Child, Dec., 1922. (17) *Birk, W., and Edelstein*: Monatsschr. f. Kinderheilk., 9, 505, 1911. (18) *Bluski, Mmc., Paris, from Czerny and Keller*: Des Kind. Ernähr. Leipzig u. Wien., 1901. (19) *Schick*: Zeitschr. f. Kinder., 1915, xiii. (20) Harlem Hospital and Sloane Maternity Hospital, New York. (21) *Rowntree, L. G.*: Water Balance, Physiol. Rev., 1922, ii, 135. (22) *Rubner, M.*: Die Beziehungen d. Atmosph. Feuchtigkeit z. Wasserabgabe. Arch. f. Hyg., 1890, 11, 137.

RADIUM AS A SUBSTITUTE FOR HYSTERECTOMY

A SERIES OF OPERATED CASES REVIEWED WITH THIS QUESTION IN MIND*

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THE problem of uterine bleeding is one which has received considerable attention in the medical literature during the last decade. In increasing numbers, these articles have dealt with the treatment of metrorrhagia by the use of irradiation, and especially the gamma radiation of radium. The results reported by Kelly, Clark, Keene, Crossen, Geechan, Scott, Taussig, and others seem to show that practically all cases of so-called idiopathic uterine hemorrhage, and the majority of cases of hemorrhage from myomata, (within certain age and pathological limits) may be best controlled by the use of radium.

The excellence of the results obtained and reported by these workers seem to indicate that a considerable proportion of cases upon whom we have performed hysterectomies in the past might at the present time be satisfactorily treated by radiation, thus conserving the uterus and not subjecting the patient to the risks of a major operation.

In order to get a more correct insight into the relative importance of surgery and radium in the treatment of uterine pathologic conditions it was deemed advisable to look over a series of hysterectomies with the idea of determining what proportion of these cases would now be treated by radium rather than by hysterectomy.

With this point in view I have reviewed a series of 132 hysterectomies performed between 1914 and 1922, during which time I have been associated with Dr. Stanton. One hundred and sixteen of these were supravaginal amputations and 16 vaginal hysterectomies. Analysis shows that these patients were operated for the following causes:

SUPRAVAGINAL HYSTERECTOMIES

Myomata, including sub-serous, intramural and sub-mucous varieties	67
Myometritis with metrorrhagia	15
Endometritis—polypoid with excessive flowing	7
Carcinoma of uterus	8
Pelvic inflammatory disease with involvement of uterus	9
Prolapse—cervical fibroid	1
Epilepsy associated with menstrual period	1
Hydatidiform mole	1
Menstrual neurosis with excessive flowing	1
Pregnancy—ruptured uterus	1
Toxemia of pregnancy	1
Atrophic uterus with hemorrhage	1

*Read before the Ellis Hospital Clinical Society in March 1923.

VAGINAL HYSTERECTOMIES

Prolapsus uteri	8
Endometritis, polypoid with excessive flowing	2
Myometritis with hemorrhage	1
Ulcerated stump of cervix	1
Carcinoma	1
Retroflexed uterus with stricture of cervical canal	

The primary mortality of these cases was 3 per cent (4 cases). The diseases for which these 4 cases were operated and the causes of death are as follows:

1. Enormous fibroid and cancer. Dying on 30th day.
2. Nephritis of pregnancy. Had refused any treatment other than hysterectomy. History of 5 previous pregnancies terminated by curettement because of kidney insufficiency.
3. Fibroid, dying of embolus on 10th day.
4. Fibroid with anal fissure. This anal fissure became infected during convalescence from the hysterectomy and a virulent cellulitis spread up through the perineum finally causing peritonitis and death.

The gross mortality in this series is only 3 per cent, and if we exclude the deaths due to the continuation of the diseases for which they were operated, we have in 130 hysterectomies only 2 deaths, one from embolus and one from a complicating infection of the rectum.

As the chief object of this study is to learn what cases might have been treated with radium and so probably would have been saved the loss of their uteri, let us turn for a moment to the consideration of the classes of cases which are most benefited by radium therapy and glance at some of the contraindications for the use of radium in utero.

To dispose of the contraindications first we find that radium should not be used:

(a) In cancer cases where the patient is in a cachectic or severely rundown condition. Radium will only hasten the end.

(b) In large fibroids the size of a four months' pregnancy or larger, and in tumors causing pressure symptoms.

(c) In cervical fibroids causing distortion of cervical canal.

(d) In young women where the amount of radiation necessary to accomplish the desired result would be sufficient to bring on an artificial menopause.

(e) In cases having an acute pelvic inflammation, or an abscess, or broken down and infected myomata, or calcified myomata.

We may list those cases where radium is indicated as follows:

(a) Simple fibroids of uterus proper, either subserous, intramural or submucous where the uterus does not extend above the umbilicus, in women who are approaching or who have passed the menopause.

(b) In endometritis and myometritis without complicating pathologic conditions necessitating a hysterectomy.

(c) In so-called idiopathic metrorrhagia.

(d) In early carcinoma of the uterus or cervix, whether or not a panhysterectomy is to be performed.

(e) As a palliative in inoperable carcinoma of the uterus and cervix.

In our series of 132 cases, I find that 103 fall incontrovertibly into the interdicted class.

There remain 29 which I believe could have possibly been cured by the use of radium without subjecting the patients to the risk and incidental discomforts of a hysterectomy. These comprise 11 cases of fibroids in women approaching or past the age of menopause, whose main symptom was hemorrhage, in uteri only moderately enlarged, and who had no complications contraindicating the use of radium; and 18 cases of hemorrhage due to endometritis or myometritis, uncomplicated by pelvic infection.

The above list represents a very conservative selection of cases for hysterectomy. We have always felt that hysterectomy should never be advised without very positive indications demanding this operation. I have not reviewed the cases simply curetted or treated medically in which we would now advise the use of radium, but it is our general impression that these cases far outnumber the cases in which hysterectomy was performed for conditions for which we would now advise radium.

We feel that one of the greatest practical fields for the use of radium is in benign uterine conditions of the type in which one would feel inclined to do a hysterectomy but yet hesitates because the severity of the disease or discomfort seems hardly to warrant such a radical procedure.

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DENTAL CARE DURING THE PRENATAL PERIOD

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IN a previous paper¹ relative to the care of the teeth during pregnancy, the observations upon thirty cases were reported. The outcome of all uncompleted cases, included in that paper, was favorable. In the past few years the relationship between dental and medical conditions has been emphasized² by many valuable contributions to the literature.

Rosenow³ and Meisser have conducted some valuable experiments on the dog. The lower cuspids of these animals were devitalized. After the pulps had been removed, bacteria in dense suspension were introduced into the pulp chambers. The canals were then sealed with impervious dental cement. These animals, as well as the control animals, were fed and cared for in a uniform manner. Five of the six dogs infected with streptococcus from the urine of patients with nephrolithiasis developed calculi. The bacteria were recovered from the stones, the kidney tissue and the teeth of these dogs and when a suspension of these bacteria was injected intravenously into rabbits, stone formations and crystallization in the tubules of the kidneys were noted. The selective affinity of these organisms was thus established. No such lesions were demonstrated in the control animals. Bumpus⁴ and Meisser have shown that pyelonephritis may often be caused by focal infections harboring streptococci which have a selective affinity for the urinary tract. They have presented a series of twelve clinical cases with careful and positive animal experiments to check the clinical results. Full mouth roentgenograms and careful examination of the tonsils were made in every case. Those teeth showing evidence of periapical infection were removed. Usually devitalized teeth not showing pathology in the roentgenograms were also removed. Cultures from these teeth showed a green-producing streptococcus when no bony change was demonstrable by the x-ray. Pyelonephritis⁵ was produced experimentally in rabbits by the use of strains obtained from these extracted teeth. The tonsils as a foci must be considered also and they recommend removal of the tonsils in cases of pyelonephritis of possible focal origin as an adjunct to the removal of periapically infected and devitalized teeth. Meisser⁶ and Gardner have made cultures from 113 pulpless teeth which were questionable in the roentgenogram, that is, teeth which are considered negative by many, or in which there is so little evidence of infection that they are usually considered harmless; 21 pulpless teeth were cultured, which in the roentgenogram showed no evidence of infection. Every one of these teeth was found to be infected; 85 of the 134 yielded pure cultures of green producing

streptococci. Fitz,⁷ writing on the preventability of certain cases of chronic nephritis, says, "Preventative measures against the development of true nephritis can be logically undertaken. Septic teeth and tonsils undoubtedly play a part in the speed with which the disease develops and should be removed." Roscnow⁸ and Meisser have been able to produce nephritis in animals by infecting the root canals of devitalized teeth with organisms recovered from foci in nephritic patients. Talbot⁹ has shown a rather definite relationship between foci of infection such as periapically infected teeth and placental infarction. This early infarction of the placenta, due to chronic infection, is the cause of early abortion in many cases. LaVake¹⁰ believes that infected teeth and tonsils are a possible cause of nephritis in pregnancy, of preeclamptic toxemia and eclampsia. Talbot¹¹ believes that the presence of undrained chronic sepsis affects the efficiency of the excretory function of the kidney. A vicious circle is established. The toxins of chronic sepsis, by their inhibition of the kidney functions, causes a retention of the normal waste products of the body. In pregnancy this is a dangerous condition and often leads to serious toxemic complications. Talbot further states that the teeth harbor foci more commonly than the tonsils and concludes that all known foci of infection, when associated with pregnancy, should be removed.

This evidence condemning septic teeth is overwhelming, especially in reference to lesions of the kidney. In view of the dangers which may arise from the presence of dental infection, the condition of the teeth during the period of gestation demands careful investigation. In the course of a properly conducted prenatal regime every possible measure must be adopted to insure the health of the mother and child. It is not sufficient to examine the urine at uncertain intervals. Possible complications should be anticipated and preventative measures instituted early in the expectant period. Knowing the dangers of septic foci and the possible development of early abortion, early toxemia, nephritis, preeclamptic toxemia, eclampsia and postpartum infection, in the course of pregnancy, their removal becomes practically imperative. If the case is seen early this may be accomplished with safety, when preoperative preparation and selection of the operative field is given proper attention.

In a preliminary report thirty cases seen at the Mayo Clinic were reviewed. Some of these patients had not completed their gestational period. The outcome in these patients was favorable. The number of teeth extracted in the group of thirty, varied from eight cases with one extraction each, to one case with fifteen extractions. Eleven of these cases had extractions done in the first trimester. This is not in accord with Talbot's¹² opinion that the best time for extraction is after the fourth month. The method employed in handling these cases was not the same as used by Talbot. This fact has considerable bearing on

the cause for hesitancy in removing foci early. These early cases were principally cases of nausea and vomiting of pregnancy. Considerable improvement was noted in these patients following removal of the foci.

The care of the mouth during the prenatal period should be along definite lines, namely, full mouth roentgenograms should be made as a routine procedure;¹³ these plates should be interpreted with the patient at hand in order that the other pathology in the mouth, especially of the gingiva, may be noted, as a dental checkup with the x-ray findings.¹⁴ Clinical conditions, attendant symptoms and findings must be evaluated in the light of the pathology found in the roentgenograms.¹⁵ Combined dental and medical judgment is necessary in determining the procedure in the individual case. This requires close co-operation between the obstetrician and the dental surgeon. In the determination of the offending teeth by the roentgenogram the teeth showing bony changes of a marked character with large abscess formation are not the sole cause of trouble in many cases. The x-ray has, in recent years, demonstrated many of the errors of dentistry. A high percentage of "saved teeth" have abscesses at the root ends. Gardner¹⁶ believes devitalized teeth, with or without bone changes sufficient to cause shadows in the roentgenogram, are infected in a high percentage of cases.

When the diagnosis is made of the involved teeth, the next step is the selection of one or two teeth to be removed as the initial procedure where there are several to be extracted. When possible, upper teeth are selected first, because of the better drainage. The first extraction should be carried out in such a way as to produce the least amount of reaction in the patient. The first reaction acts as a vaccination in many cases and subsequent extractions are accomplished with practically no symptoms of absorption.

The preparation of the patient is the next consideration. The urine should be very carefully checked, the blood pressure noted, and elimination secured by mild laxatives. Special consideration of the blood chemistry is essential in the presence of kidney conditions, toxemia of pregnancy, hypertension, and acute or chronic conditions of infectious origin.

The type of extraction is of the greatest importance. The surgical method should be used in every case where apical infection is present sufficient to produce abscess and bony change. This method is more difficult of execution and is more time consuming, but has advantages far greater than any possible disadvantages.¹⁷

The surgical method described by Novitsky,¹⁸ Shearer¹⁹ and Gardner,²⁰ and others for the removal of apically infected teeth consists briefly in the following: Block anesthesia or infiltration with novocain depending upon the extent of the operative field involved. Incision of the labial gingival tissue, exposure of the external plate, removal of the external plate with the chisel to a depth sufficient to expose

the involved area. Elevation of the tooth and removal. Removal of the abscess and involved rarified bone and closure by suture of the gingival tissue. This leaves a clean field, reduces absorption and leads to rapid healing of the tissues.

The period of pregnancy at which extraction may best be accomplished is not easy to determine. When the pregnancy is normal and no symptoms are present which are referable to the dental condition extraction may be done at any time, preferably early. The progress of pregnancy produces well defined changes in the structure of the teeth and gingival hyperemia. The greatest prophylactic benefit is derived from early elimination of the foci.

When nausea and vomiting begins early and is controlled by simple measures the procedure is best postponed. After the fourth month these cases usually subside and extraction causes less distress. When the nausea and vomiting threatens to assume proportions of a hyperemesis no time should be lost in removing any foci of infection that might be a factor. Here careful management is necessary and should consist of rest in bed, checking the urine and blood pressure, and alkalinization. Dehydration should be combated and glucose and saline given per rectum. With this preparation and the surgical method of extraction no untoward results have been noted so far. The benefit in nausea and vomiting is worthy of this procedure. Too much emphasis cannot be placed upon the necessity of preparation and the value of the surgical method over the crude and less complete method of extraction and curettage. Roentgenograms of curetted areas have shown remaining abscess after simple extraction of the teeth. This procedure has been shown to be of questionable value, the infected tissue is traumatized and infection often spread rather than removed.

In the later months of pregnancy, when the patient has come for examination late, and shows no signs referable to foci, removal of periapical infections of a mild character are best postponed until after the puerperal period is past. The kidneys, in the later months, must receive especial attention and the presence of albumin in small quantities has disappeared after removal of the foci in the teeth.

Marked dental sepsis in the later months should be cleaned up. Oral sepsis is a real danger in the postpartum period and a potential cause of puerperal sepsis. Preeclamptic toxemia and eclampsia should always be considered a possible complication and it can be guarded against by proper care of the foci of infection. In the event that a chronic nephritic condition is present, which is aggravated by an acute nephritis superimposed, the removal of infectious areas is a very delicate procedure. Caution is essential. Careful preparation is necessary. Renal functions and blood retention must be studied. Elimination of the septic foci must be slow and gradual with careful observation attendant.

Abcessed teeth alone are not the only conditions in the mouth to which attention must be drawn. Prophylactic peridontia should be carried out in every case where the gingival tissue shows signs of pathologic involvement. Treatment should be instituted early in the period of pregnancy, and continued so long as the dental surgeon believes advisable. Further, cavity formation, although simple in character before pregnancy, is aggravated during pregnancy and vital teeth should be preserved. It is a well known fact among the laity, that dental decay progresses rapidly during the gestational period. This has led to the saying, "For every child a tooth." An aversion has also been built up against dental manipulation during this period. This is a fallacy. Dental caries should be treated. Permanent fillings in large cavities, inlay and bridge work, however, is often tiring to the patient and the results unsatisfactory because of the softened condition of the teeth. Temporary cement fillings are more advisable. Administration of calcium by mouth is valuable in the later months of pregnancy as a routine procedure. With this program for the care of the mouth, much good can be accomplished.

SUMMARY.

The teeth as a source of infection in certain kidney lesions, is recognized.

The function of the kidney must be safeguarded during pregnancy.

Teeth showing evidence of periapical infection may be safely removed during pregnancy.

Co-operation of the dental surgeon in diagnosis and treatment is a necessity.

Preparation of the patient is essential.

Selection of the teeth to be removed is of importance.

Removal of the areas of infection should be by steps.

Surgical removal is the method of choice in most cases.

Local anesthesia is satisfactory in practically every case.

The period of pregnancy at which removal may be best accomplished depends upon the condition of the patient.

Early removal of the dental foci should be a part of every prenatal régime.

Prophylactic peridontia is equally important.

Carious teeth demand attention.

Temporary dental fillings are more advisable than permanent work.

BIBLIOGRAPHY

- (1) The Management of Teeth During Pregnancy; New York Lying-in Hospital Bulletin, September, 1922, Dental Summary, March, 1922.
- (2) Mayo, C. H., and Meisser, J. G.: Dental Summary, 1922.
- (3) Rosnow, E. C., and Meisser J. G.: Jour. Am. Med. Assn., lxxviii, 226-267.
- (4) Bumpus, H. C. and Meisser, J. G.: Arch. Int. Med., xxvii., 326-337.
- (5) Bumpus, H. C., and Meisser, J. G.: Jour. Am. Med. Assn., lxxvii, 1921, 1475-1479.
- (6) Meisser, J. G., and Gardner, B. S.: Jour.

Nat. Dent. Assn., July, 1922. (7) *Fitz, R. ginald*: Minnesota Medicine, 1921, iv, 611-620. (8) *Roscnow, E. C., and Meisser, J. G.*: Jour. Lab. and Clin. Med. vii., No. 12, September, 1922. (9) *Talbot, J. E.*: Surg., Gynee. and Obst., June, 1921, 552-556. (10) *LaVake, R. T.*: Jour. Lancet, 1916, xxxvi, 601-605. (11) *Talbot, J. E.*: Surg., Gynee. and Obst., Feb., 1919, 165-174. (12) *Talbot, J. E.*: Jour. Am. Med. Assn., 1920, lxxiv, 874-878. (13) *Lyons, D. C.*: The Necessity of Routine Full Mouth Roentgenograms in Dental Diagnosis. Mayo Foundation Thesis. (14) *Gardner, B. S.*: Minn. Medicine, June, 1922, 356-359. (15) *Gardner, B. S., and Lyons, D. C.*: Dental Summary, 1922. (16) *Gardner, B. D.*: Mayo Clinic. Personal Communication. (17) *Eusterman, M. F.*: Dental Cosmos, September, 1921. (18) *Novitsky, G.*: Dead Teeth. Dental Summary, 1919, xxxix, 426-432. (19) *Shearer, W. L.*: Jour. Nat. Dent. Assn., 1920, viii, 499-504. (20) *Gardner, B. S.*: Internat. Jour. Orthodontia, 1921, vii, 145-151. (21) *Mitchell*: Med. Record, 1910, lxxviii, 906.

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Society Transactions

TRANSACTIONS OF THE AMERICAN GYNECOLOGICAL SOCIETY

FORTY-EIGHTH ANNUAL MEETING

HOT SPRINGS, VIRGINIA, MAY 21-23, 1923

(Concluded from November issue)

DR. JOHN FRASER, Montreal, read, by invitation, a paper on **Placental Circulation**. (See page 645 for original article.)

DISCUSSION

DR. OSKAR FRANKL, VIENNA, AUSTRIA.—About the middle of pregnancy we see the epithelial cover of the villi still consisting of the Langhans cells and a layer of syncytial cells, followed toward the end of pregnancy, by the third stage of senility of the placenta. That is the time when the syncytial cell boundaries obliterate, and we see only a band of protoplasm. The physiology of the fetus has no doubt a close connection with these changes. It is very plain to anybody who has studied this question that physiologic involution of the surface epithelium must be very closely connected with the physiologic involution of the vessels of the villi. We can thus understand the physiologic loss of weight of the fetus in the last week of pregnancy.

DR. OTTO H. SCHWARZ, ST. LOUIS, MISSOURI (by invitation).—From Dr. Fraser's statement I assume he refers to the formation of so-called white infarcts as being due to the obliteration of the placental circulation.

Dr. McNalley in our service has been studying placental lesions intensively during the last year or so, and he comes to the conclusion that Young is right in his description of the red infarcts, and that the red infarct develops subsequently into a white infarct.

I have some sections which demonstrate the transitory stage from a red to a white infarct. In the red infarct the fetal vessels are dilated and contain much blood. The fetal circulation is apparently not definitely disturbed. Then follows the disappearance gradually of the syncytial cells with a deposition of fibrin in the intervillous spaces. The changes which occur in the uterine vessels which may be of significance in the production of so-called infarcts, I will bring out in the discussion of another paper.

Furthermore, in the consideration of the syphilitic placenta this lesion shows beautifully marked obliteration of the fetal circulation, yet it is well known that in a syphilitic placenta histologically there is no coagulation in the intervillous spaces, and the syncytial cells are present throughout. This, I believe, is a point against the fetal vessel origin of infarcts.

As a matter of interest I would like to mention another point which Dr. McNalley has brought out recently which, so far as I know, has not been previously described. In studying the placental end of the cord stained with Orcin-van

Gieson stain, he found that the vein in many instances had a very well developed internal elastic membrane. In about one-half of the cases this was rather perfectly developed, while in about one-fourth of the cases it was developed half-way, or slightly more, and in the remaining one-quarter somewhat to a less degree. The sections studied showed, in no instance, any definite attempt in the formation of an internal elastic membrane in the arteries; although in a few instances it existed in a poorly developed state. We have been unable to find similar descriptions elsewhere. This is exceedingly interesting when it is recalled that the umbilical vein carries arterial blood.

DR. FRASER (closing).—Dr. Schwarz has opened up quite a controversial subject when he alluded to the origin of these infarcts. In these very early senile changes, where the villi are otherwise fairly healthy, and the epithelium dead, we noticed an endarteritic change and a sort of dropsical swelling or edema of the stroma with a fibrinous change right in the core of the villus. I am not saying that is absolutely the case, but these pictures and some of the sections are suggestive of a primary vascular change.

DR. NORRIS W. VAUX, Philadelphia, Pa., read by invitation, a paper on **Pyelitis of Pregnancy.** (See page 681 for original article.)

DISCUSSION

DR. CHARLES C. NORRIS, PHILADELPHIA.—It is difficult to discuss a paper in which you find yourself in almost complete accord. Dr. Vaux has covered the subject in a very comprehensive manner and his suggestions for treatment are conservative and excellent.

One of the chief points of interest is the etiology. Despite the statements of some authorities I cannot but feel that pressure, or at least constriction, of the ureter is a definite factor in weakening the local resistance. It has been pretty well proven that all these cases are hematogenous in origin, the colon bacillus group being the most frequent cause of trouble and staphylococcus or streptococcus occurring less frequently. A point of interest and an argument against pressure being an important etiologic factor is that pyelitis rarely occurs in conjunction with myomata, although hydroureter is by no means unknown. Perhaps the slow growth of the myoma may have something to do with this.

Clinically, we find pyelitis of pregnancy occurring in two types: (1) a moderately insidious onset, usually preceded by an albuminuria and generally due to colon bacillus and (2) acute cases, with sudden onset, often with severe symptoms, and often due to the staphylococcus or mixed infection. In eight cases recently seen by me, four were of the acute type and four of the more chronic form. The acute variety may readily be mistaken for appendicitis, calculus or even sepsis. The fact that there is generally tenderness over the renal area and pyuria should, however, lead to the correct diagnosis. On one occasion I removed a normal appendix in such a case due, I believe, to misinformation regarding a urine analysis. The similarity of an acute appendicitis is, however, very striking in some cases. As regards prognosis, the disease is rarely fatal and abortion also relatively infrequent. I have never had to empty the uterus for this condition. Treatment along the lines suggested by Dr. Vaux is generally effective.

I recall one case who had had two pregnancies, both terminated by spontaneous abortion, and who came into my hands early in her third pregnancy. In this case pyelitis developed as in the two preceding pregnancies, but rather energetic

treatment carried her to within two weeks of term when labor began, and a live infant was secured.

DR. FLOYD E. KEENE, PHILADELPHIA.—One important fact stated, is that it is impossible to give one specific cause as the etiologic factor in the development of pyelitis of pregnancy. In other words, there is the cooperation or combination of two or more causes that are active, and these may be constitutional or local in nature. Anything that predisposes to diminished resisting power on part of the individual will be an etiologic factor of importance.

So far as the active or immediate factors are concerned in producing pyelitis, I feel strongly that there are two which are necessary. The first is the presence of infection, and the second is some form of peripheral obstruction along the lower urinary tract. We know how common it is to find bacilluria in pregnant women. A normal kidney can secrete bacteria and show no effect from it, but if there is obstruction to the proper drainage of the kidney we have sometimes the development of infection and pyelitis.

I am also a strong believer in the hematogenous origin of kidney infections. Why it is we are not able to determine infections by positive blood cultures, I do not know, but I think both the experimental and clinical evidence point to the conclusion that such lesions are usually due to a blood-borne infection.

Infections in pyelitis of pregnancy are exactly the same as in the nonpregnant woman so far as the bacteria that are active are concerned. They again can be subdivided into the colon group and the aerogenes capsulatus, and less commonly the pyogenic organisms, such as the staphylococcus and streptococcus, and third, a combination of the two. This is in accord with experimental work that has been done more or less recently. For instance, an article which has appeared only in the last few months by Rosenow and Bumpus from the Mayo Clinic brings out the fact that in all probability the primary invader in causing the infection is either the staphylococcus or streptococcus. Kidney resistance is lessened, and the colon bacillus is a secondary invader, and because of its rapid growth the primary organisms lose their identity.

As far as their effect on the kidney substance itself is concerned, these organisms are different. The characteristic lesion produced by the colon bacillus is one that involves the straight tubules and pelvis of the kidney. Clinically, this is demonstrable because very early in colon bacillus infections we have pyuria. The typical sites for pyogenic organisms, streptococci and staphylococci, are found in the glomeruli and in the cortex. The lesion first brought out by Brewer of what he called acute, suppurative hematogenous nephritis is typical of the lesion. Cases must arise in the pregnant as well as nonpregnant woman where we are dealing with such cases as these. It is in these cases we have the patient hard hit, giving symptoms of some acute abdominal catastrophe, with no pus in the urine. We find no pus, for the simple reason that the minute miliary abscesses are limited to the cortex of the kidney and have not broken through into the straight tubules and into the kidney pelvis. So much for infection. In addition to that, we must have peripheral obstruction. I think in a certain proportion of cases the uterus, by virtue of its pressure alone on the ureter, especially as it crosses the pelvic brim, may produce obstruction, but I am of the opinion that this is not true in the majority of cases. If one studies the bladders of these pregnant women cystoscopically, one is immediately struck with the absence of signs of infection, and with extensive distortion of the bladder base, which means distortion of the terminal ureter. These alterations can easily produce a partial occlusion of the ureter, and on passing a ureteral catheter, one can demonstrate the obstruction a few centimeters above the ureteral meatus. I am inclined to believe that in some cases the uterus, by virtue of its pressure, produces obstruction, but in the

majority of cases that is not so; the trouble is due to either distortion of the bladder or to edema of the terminal portion of the ureter.

As Dr. Vaux has mentioned, and as Dr. Curtis has pointed out in a recent paper, we commonly demonstrate residual urine in pregnant women which may be an important factor in the development of pyelitis. There may be urethral obstruction with the same results as in prostatitis, leading to a ureteral reflux and later to a true pyelitis.

As far as treatment is concerned, I think we all realize that in the nonpregnant, 60 or 70 per cent of all acute pyelitis cases will recover under medicinal measures. Kidd, in his excellent monograph, has brought out this fact very strongly and clearly. The same holds true in the pyelitis of pregnancy, for the majority of patients get well with nothing but posture, rest, elimination and alkalization of the urine. I have found in my own experience it is very seldom that the urine has been alkalized. In other words, if we would get the effects of alkalization we must administer large doses and continue to do so long enough. How the alkalization works I do not know. It has never been determined. It has been shown *in vitro* that it is possible to grow the colon bacilli in alkalinity even higher than we can possibly render the urine. Therefore, the old theory that alkalization of the urine diminishes the growth of the colon bacillus is not true. I am inclined to believe that in all probability the alkalies act as diuretics and give better drainage, and thus allow the infection to take care of itself.

A certain group of cases will not respond to medicinal measures, and will require ureteral catheterization. This type is evidenced to a certain extent by symptoms of peripheral ureteral obstruction. I have found that this type of case responds beautifully to catheterization of the ureters, and the injection of some antiseptic, such as mercurchrome.

There is another type of case in which medicinal measures and ureteral catheterization have no effect whatever, and here we may be dealing with a cortical renal infection of pyogenic origin, due either to the staphylococcus or streptococcus. Under such circumstances the induction of abortion is a life-saving measure.

DR. ARTHUR H. CURTIS, CHICAGO, ILL.—First, irrespective of what part of the body is involved, failure to secure proper drainage is an exceedingly important factor in the maintenance of chronic infections. I am confident that the chief cause of pyelitis is contamination of residual urine, whether this residue be in the bladder, in the ureter (notably edema of the mucosa), or in the kidney. Either with or without a focus elsewhere, bacteria filter through the kidney with great frequency; or the urinary tract may become involved by bacteria which have ascended into the bladder. These two factors, a predisposing stagnation of urine combined with bacterial invasion, suffice to produce persistent infection.

Secondly, I agree with Dr. Vaux that infection is nearly always caused by bacilli of the colon group, which rarely produce spontaneous abortion. Sometimes, however, there is hemolytic streptococcus infection; and with invasion of the urinary tract by these bacteria there is not rarely an associated abortion or stillbirth.

DR. EDWARD A. SCHUMANN, PHILADELPHIA.—I entirely agree as to the treatment. We often find that tendency to overtreatment referred to in the management of pyelitis in pregnancy. These cases are too frequently approached primarily by ureteral catheterization and flushing out of the kidney pelvis with some solution. We have found in our experience at the Philadelphia Hospital and at the Jefferson Hospital that posterial treatment is usually sufficient. We prefer the Trendelenburg position and put the patient on a highly restricted diet, and if they do not yield directly to simple measures of this kind, there is usually present one

of two things, either as Dr. Keene has said, a distinct obstruction in the ureter (and I do not think it is due to pressure) or, a remote focal infection. It is our routine that when a case of pyelitis of pregnancy does not show distinct signs of amelioration within four or five days to make an extensive study of the patient with regard to foci or infection elsewhere, the tonsils and the teeth. There may be a chronic appendix which has been found causative in a number of instances.

As to the induction of abortion, I believe firmly with Ballantine who, in a survey of a series of cases of abortion in pyelitis, found that it occurred particularly in the fulminating cases that are ushered in by a chill and rapid elevation of temperature, and in which the fetus dies as a result of direct insolation.

DR. WILLIAM C. DANFORTH, EVANSTON, ILLINOIS.—I believe that the infection in pyelitis of pregnancy is of hematogenous origin; that obstruction has a great deal to do with it, and that retention of urine in the bladder, which Dr. Curtis has emphasized, is one of the most important factors. Occasionally there is mechanical obstruction of the ureter itself by the pressure of the pregnant uterus. On two occasions I have been able to demonstrate this with the ureteral catheter. The catheter passed above the level of the pelvic brim and could not be passed further when the woman was in the horizontal position, but on turning her upon her left side the ureteral catheter passed without difficulty. Some years ago, in our maternity we did a series of urinary examinations in infants. Examinations of catheterized specimens taken upon the first day of life, showed, in a fair percentage, the existence of a pyuria which we believed was due, in all probability, to pyelitis that existed at the time of birth. Abortion in some cases of pyelitis of pregnancy may occur as a result of the death of the fetus due to high temperature. We have had one case in which that has happened twice.

We have treated pyelitis cases conservatively for the most part, by using postural methods, together with water in large amounts and urinary antiseptics. We have reserved the ureteral catheter for those cases which have resisted the ordinary forms of treatment. I am not particularly enthusiastic about it, but there were two cases in which we were able to definitely effect a cure. We have left the catheter, as a rule, in about three hours.

DR. WILLIAM E. STUDDIFORD, NEW YORK CITY.—I wish to mention one etiologic factor in the pyelitis of pregnancy that I think is of some importance and not frequently mentioned. During the past year I have seen three cases of acute pyelitis developing after vigorous attempts at catharsis, where the constipation had become aggravated and where large doses of calomel were used. In cases of pyelitis the use of calomel on two occasions has aggravated the pyelitis, and I believe that frequently attempts at vigorous catharsis are the primary factor in the onset of the pyelitis, probably from irritation of the intestinal tract which makes it easy for the colon bacillus to cause infection of the kidney. Dr. Little in his postpartum care of women found that the use of vigorous catharsis produced a rise in temperature. I believe that the pyelitis which develops on the eleventh or twelfth day following labor is often caused by attempts to force the secretion of milk by taking too large quantities of cow's milk by the mother: with a resulting intestinal upset and constipation.

Another thing: Dr. Vaux in the treatment of these cases mentioned the Fowler position. Our experience has been that the Trendelenburg position or elevating the foot of the bed gives better drainage where pressure of the uterus is an obstructing factor rather than using Fowler's position.

DR. RUDOLPH W. HOLMES, CHICAGO.—For many years I have held that there were two types of pyelitis in the obstetric relation, one *in* pregnancy, and the other *of* pregnancy. We may generally find a history of repeated attacks of illness,

covering a period of years, diagnosed or not recognized, as a disease of the kidney. The anatomic changes incident to pregnancy offer favorable conditions for the lighting up of a more active process than formerly had obtained. Withal the pyelitis rarely produces active symptoms, as the woman has acquired a relative immunity to the bacteria responsible for the chronic, recrudescence form.

The pyelitis of pregnancy is a very different matter. Very often the onset is extremely abrupt, with very marked symptoms, pain and high temperatures, offering a sharp contrast to the chronic recrudescence form. Pyelitis of pregnancy may be very fulminating, with symptoms so masked that often the attack is misinterpreted. Most commonly the erroneous diagnosis of appendicitis is made.

Few will now question the opinion that commonly the cause is blood-born. We do not doubt that some cases are produced by an ascending infection from the bladder. We have had ureteral pressure ascribed as the cause of kidney involvement ever since Halbertsma declared eclampsia was due to this cause, and it did not take long to demonstrate the error. All the frozen sections of the pregnant or parturient women made by Winter, Webster, Hart and Barbour, and others have plainly shown that the anatomic conditions of the pregnant precluded pressure, just as the study of frozen sections demonstrated the fallacy of pressure in relation to eclampsia, so I believe it proves the erroneousness of the opinion of its being an etiologic factor in relation to pyelitis.

Dr. Curtis has contributed a very valuable bit of information when he showed us that stasis of the residual urine greatly contributed to the production of cystitis. The sagging of the bladder, even its sacculation during pregnancy, promotes residual urine. It is too plausible to be denied that an ascending infection may arise from cystitis.

The common opinion obtained a few years ago that pyelitis is generally an unilateral infection. Too many cystoscopic examinations, with ureteral catheterizations, have been made to believe this now. It generally is a bilateral infection, though often in the acute stage symptoms may be referable to one kidney.

I agree with Dr. Vaux that therapeutic abortion rarely is indicated, but I believe an interruption of pregnancy two to four weeks before term is desirable in those cases where improvement has not been marked.

DR. JOSEPH L. BAER, CHICAGO. I should like to touch on these points in connection with this paper. First, as to the location of the compression. If the uterus exerts pressure at all, it is more likely to be above the pelvic brim where the ureter crosses the psoas and lumbar dorsalis muscles and not at the bony edge of the pelvic brim.

In the second place, a single urinalysis is never sufficient to rule out pyelitis. So often in the colicky attacks there is obstruction on the affected side, due to edema or a plug, the urine obtained is from the healthy side and is clear, but later, when the obstruction is released, the urine from the affected side changes the character of the urinalysis.

In the third place, the mere mechanical passage of the ureteral catheter in cases with obstruction and colicky pain is sufficient frequently to relieve the distress without any pelvic lavage. The obstruction is intraureteral with edema of the mucosa, and the passage of the catheter seems sufficient to release the mucous plugs that may be blocking the canal because of its decreased lumen.

DR. FREDERICK H. FALLS, Iowa City, read, by invitation, a paper entitled **Carcinoma of Bartholin's Gland with Report of a Case.** (For original article see page 673.)

DISCUSSION

DR. FREDERICK J. TAUSSIG, St. Louis, Missouri.—Glandular metastases in these deep seated vulvar carcinomas occur early and are very extensive. The prognosis of a case of vulvar carcinoma is proportionate to the depth at which the malignancy originates. This type of Bartholin gland cancer is almost uniformly fatal. An operation may temporarily relieve the condition, but glandular metastases occur a year or two afterward and the patient dies. On the other hand, we have cases where the lesion springs from the labial skin, and these are of the everted and inverting type. The inverting type occurs usually in younger individuals and is quite malignant. The everted type usually develops upon the basis of a leucoplakic vulvitis, at a point where the skin is sclerosed. These cases in my experience are relatively benign, and I can record three five-year cures out of a total of six such cases, 50 per cent five-year cures. Of course, this material is small, but we are dealing with a condition that is rare. It indicates that this form of carcinoma gives a very different prognosis from the cancer that develops from Bartholin's glands.

DR. DEWITT B. CASLER, BALTIMORE, MARYLAND.—We have had in our clinic in Baltimore, beside the case of Dr. Kelly's, which Dr. Falls has just mentioned, three malignant tumors of Bartholin's glands, one a sarcoma, a second case of Dr. Kelly's of adenocarcinoma, and a third case of papillary cystadenoma, which shows malignant changes in certain places. The second of these tumors was operated upon by Dr. Kelly in 1907, for a prolapse of the uterus. At the time of operation, she was found to have a small tumor, about the size of the end of the thumb, in the labium on one side. This tumor was excised, and in the laboratory proved to be an early adenocarcinoma of Bartholin's glands. This patient is still alive and perfectly well.

It has always seemed to me rather remarkable that a gland like Bartholin's gland, constantly subject to irritation and trauma and repeated attacks of inflammation, should not show malignant changes more often. These three cases, which I have mentioned, have not been previously reported, and I thought it would be wise to make them a matter of record.

DR. FALLS (closing).—In connection with the treatment I did not mention the fact that we operated primarily on this case in March, 1922, and we used radium as soon as we found out it was malignant. I had her come back in May and used more radium, and then in July we did a radical removal of the glands of that same side, taking in the lymphatics, and cleaned out the inguinal region. This was done prophylactically, and there was no sign at that time of carcinoma in the glands or the tissues surrounding.

DR. FREDERICK C. IRVING, Boston, Mass., read by invitation a paper entitled **Abdominal Hysterotomy under Morphine, Scopolamine and Local Anesthesia.** (For original article see page 688.)

DISCUSSION

DR. WILLIAM E. STUDDIFORD, NEW YORK CITY.—Dr. Irving's technic as described, appears most reasonable, and apparently very easy. However, it requires

absolute adherence to detail. His proposition of doing hysterotomy in these cases and the secondary sterilization is one that, I believe, is done too seldom. Many of these cases have been subjected often to simple abortion with repeated pregnancy, and increasing the cardiac or kidney disease. In the cardiac cases with decompensation, I believe the first contention to be advanced is that pregnancy should be ignored; that it is absolutely a medical proposition, and it has been rather surprising to me in the last three years, where we have followed this plan and have turned our cases over to the internist, how well they have recovered from their decompensation under appropriate treatment, how many of them can be carried to term, and the ease with which they go into labor.

With a small amount of morphine and scopolamine the first stage is easily carried through, and then helping these women during the second stage the results have been most satisfactory, so that we have had to do cesarean section in only one cardiac case, in which there was a marked pelvic deformity.

We have had 17 cases in which hysterotomy and sterilization have been indicated, in which local anesthesia, as described by Dr. Irving, could have been used. These include five in which the indication was a tuberculous condition, three in which there was cardiac disease, and six were hypertension or nephritic cases. All of these cases were brought into the hospital, subjected to a thorough medical examination, and put directly under the charge of a medical man.

As to their duration in the hospital prior to operation, the average stay for the tuberculous cases was six days; for the cardiac cases 17 days, and for the nephritic cases seven days. All of them were operated upon under general anesthesia usually, with a primary dose of morphine, followed by gas-oxygen in which a small amount of ether was given to obtain the primary relaxation. The rest of the operation was carried on under gas-oxygen anesthesia. In these 17 cases there have been no deaths. In all cardiac cases I am more and more convinced that they should be under proper medical care. Cesarean section and hysterotomy in primary pregnancy can be carried on. In the case of a second pregnancy, I believe if the cardiac condition has not improved in the interval, a hysterotomy and sterilization should be done early in pregnancy before signs of decompensation have developed.

DR. ARTHUR H. MORSE, NEW HAVEN, CONNECTICUT.—I have been particularly interested in Dr. Irving's paper, for during the past few years we have treated several cases along similar lines. Among these was a primipara, 37 years of age, who was admitted with preeclamptic toxemia and a heart which was on the verge of decompensation. Three years previously a nephrectomy had been done for renal tuberculosis. Upon the day of admission orthopnea was so great that she could not lie down and while the immediate termination of pregnancy was imperative any vaginal procedure was out of the question. Nor could a general anesthetic be safely administered. Accordingly, an abdominal cesarean section was performed under novocain anesthesia. We did not employ scopolamine as Dr. Irving has suggested, but gave the patient a fourth of a grain of morphia just before she was taken to the operating room.

I was impressed by the slight discomfort which this patient felt during the operation. She talked throughout the procedure and would not believe that her child had been born until she heard its cry. Moreover, she stated that were she to undergo a third operation she would prefer a local to a general anesthetic. During the past year a similarly favorable result was obtained with novocain anesthesia in the case of an elderly woman from whom an enormous ovarian cyst was removed. With regard to general anesthetics, we have, for the past year, employed oxygen and gas almost exclusively in all our gynecologic and obstetric work.

DR. GEORGE W. DOBBIN, BALTIMORE, MARYLAND (by invitation).—I have been profoundly impressed in the last few years with the efficacy of nitrous oxide anesthesia when administered by a thoroughly skilled anesthetist.

In the last year I have done four cesarean sections on women who were extremely bad risks, two cardiac cases with broken compensation, one diabetic and one patient operated on at the end of an acute lobar pneumonia.

DR. IRVING (closing).—There is one problem that has bothered us a great deal. All deaths were in the cardiac series, and there have been a certain number of cases admitted to the hospital badly decompensated and who have been under adequate medical care. In spite of that, these cases have not improved; at least, they have not become entirely compensated. Some of them have, for a time, improved, and then grown worse, and the problem was what to do with them. Rather than take chances of things getting into a worse state than they were, we have delivered these patients. We may have done the wrong thing. It was in that class of cases we had two deaths. What Dr. Morse had to say about this type of patient is very important. An intelligent woman, who can cooperate with you, does not require a preliminary dose of morphine and several doses of scopolamine, but I think in all cases it makes the operation easier for everyone. I want to state emphatically that the operation is more satisfactory not only for the patient, but for the operator if the patient's senses are not present.

DR. OTTO H. SCHWARZ, St. Louis, Mo., read, by invitation, a paper entitled **Blood Pressure Changes Following Delivery**. (For original article see page 656.)

DISCUSSION

DR. HAROLD C. BAILEY, NEW YORK CITY.—One of the most interesting things to me is the very considerable number of cases Dr. Schwarz presents to us with a study of short duration. I think he is very probably right when he says that a drop in pressure is not unusual following delivery where the blood pressure is raised to any great extent. I was led to take up these observations when I joined the Bellevue Hospital Service in 1909. There were several cases of eclampsia that died on the table. We were using accouchement forcé by the method of bimanual dilation, the Edgar and Harris methods, and rapid delivery. Strange to say, those patients who succumbed at once did not do so, as far as we could determine, from any trauma produced in the uterus. In the first case of eclampsia in which I took blood pressure readings and pulse tracings, there was a drop of 100 millimeters of mercury and the patient died at once. Apparently it was not an uncommon proposition following immediate delivery in eclampsia.

To make our observations complete we worked out the matter; for instance, within a few months with the veratrum viride alone we saw the blood pressure drop 145 millimeters of mercury with the woman undelivered. With delivery alone, with no drugs, we presented a case in which there was a drop in blood pressure of 100 millimeters and in another a drop of 70 millimeters and both recovered. So, it seemed to me, clearly evident at the time, and I believe it now, that these cases should not have drugs as vasodilators of the type of either nitroglycerin or veratrum viride; there should be no bleeding until the woman is delivered and one knows exactly what cardiovascular reaction occurs, and accouchement forcé should be absolutely relinquished.

There is one other point in regard to the treatment Dr. Schwarz brought out, which is very important and that is the tight binder. I believe that we may

use sand-bags to the abdomen as was suggested by Hyde for use after laparotomies, and these would be a great help, because I feel certain that much of the trouble is due to the splanchnic dilation. Strange to say, I had a death two days after I received Dr. Schwarz's abstract. The patient had a blood pressure of 260 and had lost, two days before delivery, a pint of blood from accidental hemorrhage. She was growing worse rather than better, so labor was induced and later a moderately difficult version was done. There was some trouble in extracting the shoulders, and following delivery the patient went into shock and died on the table. She had a drop in blood pressure from 260 until it could not be read and yet, from the standpoint of trauma, there was only a tear through the cervical ring that extended a very short distance above.

I feel that this demonstration today ought to convince us that these women should be treated by the Dublin or Stroganoff methods or by modification of such methods and delivery should not be forced.

DR. WILLIAM E. STUDDIFORD, NEW YORK CITY.—Dr. Schwarz's presentation has brought up a condition that we have been tremendously interested in in the last few years at the Sloane, and have come to some pretty positive conclusions as to the handling of these cases. The question of blood pressure just prior to the onset of labor is very important, in the last months of pregnancy these cases with hypertension will have a rise in blood pressure at about the time of the menstrual period, with an increase in the albumen, with drops in the intermenstrual time, and at the onset of labor there is a distinct rise. That type of case is not suitable for operative procedure from below. Rapid delivery, accouchement forcé, induction of labor with bag, almost invariably leads to serious complications, and if delivery is necessary at the time, if there is no response to treatment our plan is to give them large doses of morphine as a rule. Cesarean section is a much better operation. Many of these cases occur in elderly primiparae or in multiparous women who have had difficult labors with a badly scarred and fibrous lower segment that does not easily dilate. Dr. Schwarz reports four cases in which there was rapid delivery by version with an enormous drop in blood pressure. The shock following such a procedure through the lower segment almost always brings about that result. Where a case has not progressed with an easy first stage with suitable dilatation of the cervix, I am more and more convinced that cesarean section will give us a better result and a lesser tendency to this drop than operative delivery through the vagina.

As to the bandage, we have been using for the past year or more in all cases of this type and especially in twin cases, where there is an enormous relaxation of the abdomen, a system of strapping, and the more we use it, the more we are inclined to increase the indications for it. We start with a tight wide strip of adhesive plaster across the pelvis, so that it goes well over from the trochanter across the lower border of the abdomen. These two strips of adhesive plaster are drawn up to the ensiform cartilage, then across the bandage and down to the anterior spine. The effect of that is to give control of the abdominal muscles, and there is less tendency at that time to interfere with relaxation of the abdominal wall, and it is a more permanent bandage than you can get with a tight binder.

DR. M. PIERCE RUCKER, RICHMOND, VIRGINIA.—There is one point in connection with the discussion of this subject that I think we have to bear in mind, and that is the remarkable variation in blood pressure in eclampsies before delivery. If you take the blood pressure every five minutes you will find that it will drop and go back again, by at least 100 degrees of systolic pressure in the course of 15 or 20 minutes.

DR. CAREY CULBERTSON, CHICAGO, ILLINOIS.—I feel that Dr. Schwarz has explained a phenomenon which is frequent after labor. We have all seen symptoms of shock after normal labor whether the patients were toxic or not. The explanation appears to be that the drop in the systolic pressure is out of proportion to the drop in the diastolic.

As to the method of treatment in toxic cases, I am not sure but that the anesthetic which has been used in association with many of these methods of accouchement forcé has played a part in the production of this rapid drop in blood pressure, because in Webster's large series of cases of cesarean section in which there was no loss of mother or child, and many of which were done for a toxic condition, for eclampsia, none were lost. But this method was rapid delivery by cesarean section without a general anesthetic, using only local anesthesia with nitrous oxide gas in some cases, but never ether. There were no prolonged operations; the sections were done rapidly by the classical Säger method. If the patients developed shock afterward they were stimulated. I do not recall that venesection was employed after abdominal section in this series.

DR. SCHWARZ (closing).—There were two autopsies on these cases of accouchement forcé, and in both instances the uterus was found intact. There was no great hemorrhage associated with any of the cases.

As regards cesarean section, a recent British survey has shown that eclampsia treated by cesarean section alone gives a high mortality, but it must be remembered that these cases were not treated under ideal conditions. One author in studying blood pressures after operation, and after studying also cases of cesarean section, found in cases of cesarean section in which there was no toxemia, there was no subsequent drop. At any rate, the drop was not of great degree. In a case of eclampsia there was a drop of from 160 down to 70 systolic. These cases were operated on under general anesthesia. If these operations were carried out by other methods, I feel sure they can be delivered with less traumatization and less resulting shock. These cases which I reported were neglected cases, many of them. They came to the service in late pregnancy, a few days before delivery or at delivery. There were only three who were observed in the prenatal clinic. One was a private case.

Regarding the remarks of Dr. Rucker, I have noticed before delivery that hypertension cases vary markedly in blood pressure, but never to such a great degree as he has stated.

DR. JOSEPH BRETTAUER and DR. I. C. RUBIN, of New York, read a paper on **Hydroureter and Hydronephrosis**. (For original article, see page 696.)

Department of Reviews and Abstracts

CONDUCTED BY HUGO EHRENFEST, M.D., ASSOCIATE EDITOR

Selected Abstracts

Carcinoma of Genitalia

Meyer R.: The Comparison of Certain Rare Benign and Doubtful Epithelial Changes of the Uterine Mucosa in Comparison with Similar Carcinomatous Forms. *Zeitschrift für Geburtshilfe und Gynäkologie*, 1922, lxxxv, 440.

Much of the difficulty in distinguishing between benign and malignant epithelial proliferations of the uterus is due to lack of experience yet there are certain rare findings and borderline cases which may puzzle even the experienced pathologist.

Endometritis glandularis only rarely offers difficulties. The upper layers of the corporal mucosa are so often cast off during menstruation that the inflammations only rarely lead to marked epithelial proliferation. A single case of gonorrhea gave rise to carcinoma like invasion of the corporal mucosa at so many isolated areas that from this and from the swelling of the epithelium the benign character of the proliferation could be determined, analogous to similar changes in the tube.

One case with a general *endometrial hyperplasia* showed numerous transitions from simple hyperplastic glands to carcinomatous ones, particularly in the basal layer. Two other cases showed the very earliest beginnings of carcinoma of multicentric origin in hyperplastic endometrium. In other cases, there were indefinite changes with slight piling of epithelium and cell changes. In one case, in a 19 year old girl, there was a question whether abnormal ovarian function might not have caused changes in the markedly hyperplastic mucosa which would ordinarily have been classified as carcinoma. In a number of cases, small carcinomata were found in a normally functioning mucosa without general hyperplasia.

Hyperplasia of the cervical mucosa may occur in conjunction with erosion, and caused in a number of cases deep adenomatous proliferations, where differentiation from carcinoma often was difficult.

Squamous epithelial foci occur in rare cases in the hyperplastic endometrium under the basal layer of the gland epithelium and push the latter forward into the lumen. They may even fill the lumen and cause atrophy of the opposite mucosa. Single foci may proliferate in the connective tissue or may displace this so that several gland chambers come in contact. Such structures are benign, but very similar ones may occur in large adenocarcinomata or in beginning very small carcinomata. Many-layered epithelium often occurs very diffusely in the adenomatous carcinomata. Sometimes it has destructive power of itself; in other cases, it seems rather to cause degeneration of the carcinomatous tissue.

Carcinoma in endometrial polypi is relatively rare, in cervical polypi the author knows of only one case. Gland structures of such extraordinary form and branchings, and occasionally with proliferation of the epithelium which in a diffuse form would necessitate the diagnosis of malignant adenoma without hesitation, may be

quite harmless when they occur in polypi; therefore, it may be important to recognize small polypi by curettings. *Epidermization in benign polypi* is often more marked than in erosions and may lead to error even more easily.

Papillomata of the corpus are, in spite of a benign appearance in one case, probably always malignant. In the cervix even giant papillomata may be benign and resemble polypi.

Diffuse hyperplasia of the papillae and small circumscribed papillomata which resemble pointed condylomata may occasionally be found on the vaginal portion of the cervix.

Since clinical experience is the basis of histologic evaluation, a correlation of the clinical and histologic findings and cooperation of the clinician and pathologist are of the utmost importance.

MARGARET SCHULZE.

Martzloff, K. H.: Carcinoma of the Cervix Uteri. A Pathological and Clinical Study with Particular Reference to the Relative Malignancy of the Neoplastic Process as Indicated by the Predominant Type of Cancer Cell. Bulletin of the Johns Hopkins Hospital, 1923, xxxiv, 387.

Martzloff sums up his article as follows: The cells seen in epidermoid cancer of the cervix fall morphologically into three large groups; transitional, fat spindle, and spinal cell groups. The vaginal mucosa was involved in over 50 per cent of all the carcinomas of the cervix in this series, irrespective of the extent of the cervical involvement. Secondary involvement of the corpus uteri in cervical cancer occurred in 41.3 per cent of the cases in which the entire length of the cervix was involved. One third of all the patients seen during the first six months of symptomatic diseases, with the exception of those suffering from the spinal cell type of cancer, had extension of the neoplastic process to the broad ligament. Less than 10 per cent of the patients with broad ligament involvement lived more than one year after operation. The first symptom of disease in almost 85 per cent of the cases studied was some form of unusual vaginal bleeding. In 97 per cent of the cases some form of unusual vaginal discharge (either bleeding or leucorrhea) was the primary symptom. Of all the cancers in this series 52.1 per cent occurred between the ages of 36 and 50 years inclusive.

Of the patients between 31 and 35 years inclusive, 18.6 per cent are living and well today. This is the highest "cure" incidence for any five-year age period in this study. Of these patients 5.4 per cent gave a history denying pregnancy at any time, or any form of vaginal instrumentation. In 58.8 per cent of the patients operated upon where broad ligament induration was noted on physical examination, this signified carcinomatous extension. The incidence of "cures" is almost twice as frequent in the cases treated by abdominal panhysterectomy as compared with those in which a vaginal panhysterectomy was performed. The total operability of the cases in this study is 46.5 per cent, the total operative mortality is 14.2 per cent. The operative mortality prevailing in this clinic at the present time is between six and seven per cent.

Preliminary curettage performed several days prior to the radical operation for cancer was the procedure employed in 36.8 per cent of the patients who are now living and in good health. From this we would conclude that a diagnostic curettage not immediately followed by a radical operation for extirpation of the malignant process does not by any means render prognosis hopeless.

Inoperable cancer of the cervix is striking by its presence during the early period of the disease in the transitional and fat spindle cell types of cancer, and by its relative infrequency before the fifth month of the disease in the spinal cell type and in the adenocarcinomata. The incidence of the patients operated upon and traced who are living and well today is 18.7 per cent. The incidence of so-called

"five-year cures" is 26.6 per cent. In this study we have encountered no epidermoid cancer of the cervix which conforms to the basal cell cancer of the skin in regard to its apparent lack of malignancy. The histomorphology of the predominant types of cells in epidermoid cancer of the cervix is important, in that it indicates the relative malignancy of a given tumor. In this study the spinal cell type of cancer proved to be the least malignant. The transitional cell type is next in order of increasing malignancy, and the fat spindle cell type of cancer has proven to be the most malignant of all. The adenocarcinomata, as far as relative malignancy is concerned, fall in between the spinal cell and transitional cell groups of epidermoid cancer. The presence of epithelial pearls is significant only when they are associated with cancers of the spinal cell type. They then appear to indicate a lessened malignancy of the cervical new growth. C. O. MALAND.

Mattmüller: A Contribution to the Statistics of Genital Carcinoma. *Zeitschrift für Geburtshilfe und Gynäkologie*, 1922, lxxv, 106.

The author analyzed 620 cases of genital carcinoma treated in the Women's Hospital at Basel in the years 1899-1918. The age of the earliest symptoms showed a maximum number of cases at 50 years with a gradually decreasing number for each five-year period above or below this. Thirty-three per cent of the women were in the period of sexual activity, 37 per cent in the climacteric (46-55), and 30 per cent in the post climacteric period. The age of appearance of fundal carcinoma averaged 55 years.

Cervical carcinoma formed 71 per cent of cases, fundal carcinoma 15 per cent, tubal and ovarian 8 per cent, vulvar 3 per cent, vaginal 3 per cent. Fertility seemed an important factor. The average fertility of 2600 healthy women of 20-45 years was 3.4, but of 404 cervical carcinomata 4.4, of 93 fundal carcinoma 3.8. Women with very many pregnancies showed a special predisposition to cervical carcinoma; thus of 56 women who had had ten or more labors or abortions, 54 had cervical carcinoma and only two fundal carcinoma. Thirty per cent of the cases of fundal carcinoma were nulliparae. The influence of dystocia and lacerations was difficult to calculate. Cervical carcinoma complicated labor 5 times in 27,245 confinements.

The influence of previous gynecologic disease is difficult to estimate. Prolapse and desensus are, contrary to what one might expect, very rare in combination with carcinoma of vulva, vagina or cervix. Endometritis is rare as a forerunner of fundal carcinoma, though myoma and fundal carcinoma occur in conjunction rather frequently. Long standing pruritus vulvæ was found in a number of cases of vulvar carcinoma. Only 4 cases of 46 ovarian carcinomas gave a history of previous treatment of a cyst, though many authors ascribe a large number of ovarian carcinomata to malignant degeneration of a serous cystoma.

A familial history of cancer was found in 17.1 per cent of cases.

The duration of life in cervical carcinoma in the inoperable cases was 16 months; in the operable cases, including the primary mortality 15 months, excluding it, 22 months. For fundal carcinoma, the corresponding figures were 13 months, 21 months and 34 months.

The cause of death was cachexia in 69 per cent of all cases, in 77 per cent of the inoperable cases. The next most frequent causes of death were pneumonia, uremia, peritonitis, pyelonephritis, embolism and ileus. MARGARET SCHULZE.

Leitch, A.: Vaginal Involvement in Cancer of the Cervix. *British Medical Journal*, 1922, No. 3224, p. 686.

The author calls attention to the liability of cancer of the cervix uteri to extend down the vaginal wall. Postmortem examination of several hundreds of

cases showed that in 97.5 per cent the vagina was more or less extensively involved; in fact, it was the commonest of all the findings at autopsy. Involvement of the parametrium, of the interiliac lymph glands, and the occurrence of hydronephrosis were indeed less common. His argument is that these naked-eye appearances, found postmortem are an indication of the microscopic spread that would be taking place during life. But in addition to such evidence, he has frequently found lymphatic involvement in operation specimens where a vaginal cuff had been removed, and he holds that Wertheim, in advocating the removal of a portion of the vagina in order to enclose the septic cervix, had thus unconsciously done a greater service to radical treatment. Such vaginal removal, however, is not sufficiently thorough. The author in pursuing these investigations had on some occasions encountered irregular proliferations of the vaginal mucosa penetrating the underlying tissues, early epitheliomata in fact, which were quite distinct from lymphatic spread, and he suggests that these were due to the same cause, possibly an endogenous irritant, which had produced the original malignant tumor of the cervix. They were later in manifesting themselves, probably because the vaginal epithelium was more resistant to the causal agent.

F. L. ADAIR.

Kano Moukaye: Neoplasms in the Cervical Glands. *Gynécologie et Obstétrique*, 1922, v, 39.

The writer's general conclusions are: There exists a variation in proliferation of the cervical glands between the normal, the adenoma and the cylindrical type of cancer. Chronic inflammations of the cervix seem to be the principal cause of these hyperplasias which continue independent of the infection. True adenoma of the cervix is a proliferation limited to the cervical glands which preserve their normal type and their mucous secretion. This proliferation is benign. There are two histologic types, the lobulated and the papillary. The former has a more marked tendency to malignant transformation. There exists a form of adenoma which appears to infiltrate, and histologically is an intermediary between the adenoma and cylindrical carcinoma. The cylindrical cancer usually takes its origin in the adenoma. They are characterized by the absence of the mucous secretion and by karyokinetic figures. Practically the extirpation of all cervical adenoma is indicated.

F. L. ADAIR.

Wharton: Rare Tumors of the Cervix of the Uterus of Inflammatory Origin. *Surgery, Gynecology and Obstetrics*, 1921, xxxiii, 145.

Wharton describes condylomatous growths of the cervix, of which there are two types, gonorrheal and tuberculous. The symptoms are practically identical, namely profuse vaginal discharge which may be blood tinged. Both history and clinical findings may resemble cancer.

Gonorrheal condylomata may be single or multiple and, as a rule, show intense inflammatory reaction. Their cure consists in cleaning up the causative focus of infection, usually located in the cervical glands, and removing the growths. The endometrium is usually not affected and curettage is not advised.

Tuberculous condylomata are always accompanied by other manifestations of the disease. There is usually an accompanying tuberculous endometritis and salpingitis. The extent of the infection as a whole should be studied most carefully, and the operative treatment based on general findings.

The prognosis is universally good in the gonorrheal form, and in the tuberculous depends entirely on the concurrent infection. Two cases of gonorrheal and one of the tubercular variety are described.

R. E. WOBUS.

Siredey: **Early Diagnosis of Uterine Cancer.** *Paris Médical*, 1922, xii, 351.

The youth and apparent good health of the patient, as well as the absence of marked cervical lesions, often lead the physician astray. Siredey calls attention to the fact that cancer of the uterus is by no means rare before the age of 35 years.

While bleeding is the most constant symptom of both cancer of the cervix and the body, it may be very insignificant or may consist only of a bloody "hyrorrhea". In carcinoma of the cervix, a certain rigidity is sometimes noted which, especially if examination produces bleeding, is very suggestive. In cancer of the body, blood may often be expressed from the uterus by squeezing the body between the examining fingers.

R. E. WOBUS.

Coopman: **A Case of Uterine Carcinoma of Unusually Long Duration.** *Nederlandsch Tijdschrift voor Geneeskunde*, 1922, ii, 1844.

Coopman reports the case of a woman 50 years of age who had a fibroid removed in 1909. Malignancy being suspected, a radical operation was contemplated, but since the patient took the anesthetic poorly only a supravaginal amputation was done. Carcinoma was found in the extirpated uterus. In 1912 Coopman saw her. She then had an inoperable carcinoma, which he cleaned out by means of curette and scissors. On ten subsequent occasions she applied on account of bleeding, and at each time the masses were simply removed by the finger, since instrumentation had caused free hemorrhage at the first operation. No other treatment was administered.

Her general health remained good until 1919, when she died rather suddenly after an illness of two days. Necropsy was not permitted.

R. E. WOBUS.

Worthington: **Neoplasms of the Clitoris.** *Southern Medicine and Surgery*, 1922, lxxxiv, 234.

He reports a case of carcinoma of the clitoris. In 1917 Battey collected from literature the reports of 23 cases of carcinoma of the clitoris for the preceding 12 years. The condition is more common in multiparæ than in nulliparæ but is serious in both, owing to the abundant lymph supply to the pelvic nodes. Dissection of the superficial tissue of both groins, the suprapubic fat and glandular tissue must be made with the removal of the tumor itself.

W. K. FOSTER.

Van Dongen: **Two Remarkable Cases of Metastatic Ovarian Cancer.** *Nederlandsch Tijdschrift voor Geneeskunde*, 1922, i, 1630.

Metastatic ovarian cancers, formerly thought to be rare, are being reported more and more frequently.

The first case here reported was bilateral and occurred in a woman aged fifty-six years who had passed the menopause five years previously. It was secondary to carcinoma of the appendix. She withstood operation, but died 8 months later of ileus.

The second case was unilateral and occurred in a woman of thirty-eight years. She had had a gastroenterostomy done previously for gastric carcinoma and came under the care of the author during pregnancy. It was decided, in view of her hopeless condition, to let her go to term and perform cesarean section in order to save the child. However, she went into labor at six months. Even at this time the prolapsed ovarian tumor prevented the passage of the fetal head and craniotomy had to be performed. The patient succumbed three weeks later to her original trouble.

R. E. WOBUS.

Goodrich: Primary Carcinoma of the Fallopian Tubes. Long Island Medical Journal, 1922, xvi, 1.

A married woman aged forty-four years presented herself suffering from a sub-acute arthritis of both knees. No primary focus of infection was demonstrable. Since the age of thirty-nine her periods had become less and less frequent. She had noticed an occasional slight gush of thin fluid from the vagina having an odor resembling that of urine. At times this discharge was tinged with blood. On examination, the left fallopian tube was found to be exquisitely tender.

One year later, she returned complaining of an exacerbation of her arthritis, as well as of frequent cramplike pains in the left lower quadrant. The tube was now found to be definitely enlarged and even more tender than before. At operation, both tubes were removed. The right was found to be normal, the left was enlarged and contained a cauliflower-like growth which had replaced most of the normal epithelium. Microscopic examination confirmed the diagnosis of carcinoma.

Goodall believes with Ewing that chronic inflammation is the most important etiologic factor in the production of carcinoma of the tubes. In 160 cases so far reported, intermittent blood-stained watery discharge was the most constant symptom. Over 50 per cent of these cases occurred in women between the ages of forty and fifty years.

R. E. WOBUS.

Achard, H. P.: Complete Anuria in Cervical Cancer Treated by Ureteral Catheterization. Le Progrès Médical, October 28, 1922, p. 503.

The author reports a most interesting case of inoperable cancer of the cervix in which there suddenly developed anuria. Cystoscopic examination showed the left ureter to be completely obstructed. A No. 14 catheter passed easily up the right ureter and relieved the hydronephrosis. This procedure was carried out on the day following the suppression of urine and repeated daily for eleven days. After that the right ureter continued to functionate until the death of the patient which occurred about two months later.

The author feels that this procedure should always be attempted in case of cervical cancer complicated by anuria, as the procedure is without danger and may yield excellent results.

T. W. ADAMS.

Phillipowicz: Combined Abdominosacral Technic for the Radical Operation of Carcinoma of the Vagina. Zentralblatt für Chirurgie, 1923, l, 793.

On account of the rich lymph supply of the vagina, extension of the carcinoma of this organ is very extensive and occurs early. For this reason operative cures are almost unknown. Heretofore two methods of approach have been employed, the perineal and the sacral. Phillipowicz employed a combined abdominal and sacral method on a patient who has now remained well for one and a half years since operation.

The first stage of his operation consisted in opening the abdomen, mobilizing the pelvic colon, and dissecting the uterus and parametria. The ovaries were left behind, as the tumor occurred in a young woman of twenty-eight years. The pelvic peritoneum was then sewed together leaving the pelvic organs extraperitoneal. The abdomen was then closed, no organs having been removed. The sacrum was next resected and the uterus, posterior and lateral walls of the vagina, and rectum removed *in toto*. The sphincter and anus were left intact, and the upper end of the rectum united to the anus. The wound was closed with drainage and healed *per primam*. Except for an ascending pyelitis and later, a moderate prolapse of the rectum which yielded to cauterization, the patient made a good recovery.

R. E. WOBUS.

Brechet: The Treatment of Uterine Cancer. *Le Progrès Médical*, June 18, 1921, p. 287.

Brechet emphasizes the importance of an early diagnosis as an essential factor in any successful procedure. He advocates the employment of a biopsy or diagnostic curettage in any case where there is the slightest suspicion of malignancy.

Using as the basis of his classification the stage to which the growth has advanced, he places in the first group those cases in which the uterus is freely movable. With these, immediate operation is the procedure of choice. In cases in which the mobility of the uterus is diminished by the presence of a nonmalignant inflammatory infiltration of the parametrial tissues, Brechet employs a preoperative application of radium. Three tubes, each containing 20 milligrams of radium, are placed in a collar-like fashion around the cervix. The average length of exposure is thirty-six hours. When the malignant process has extended beyond the limits of the uterus, the case is considered nonoperable and radium application is advocated as a palliative measure.

Where surgical procedure is indicated, the operation of choice is the radical abdominal operation as described by Wertheim. In order to avoid contamination of the peritoneal cavity, Brechet uses iodine water douches on the day preceding the operation, and a thorough application of the actual cautery to the cervix before opening the abdomen. Following the operation he advocates the application of 20 milligrams of radium over a period of twenty four hours as an added precaution against recurrence of the process.

T. W. ADAMS.

Faure, J. L.: Treatment of Cancer of the Cervix of the Uterus. *La Presse Médicale*, 1923, No. 41, p. 461.

The author reviews the development of the treatment of this lesion from his student days, when it was considered to be absolutely inoperable, to the present day of radium and surgery, singly or combined, with cures in varying percentages reported from various clinics. He performed his first abdominal hysterectomy in 1896, and one of his cancer patients, operated upon in 1899, is still living.

In 1910, radium entered the field, and Faure first began to employ it after operation, to destroy cancer cells that might have been left in the pelvis. In 1913, he observed a remarkable cure in a woman in whose case the inoperability was established by laparotomy. She was treated with a large quantity of radium, almost 50 centigrams, left in place for two days. The patient is still living and is perfectly well. After this, Faure treated the majority of his inoperable cases with radium, with fair results.

The author's personal experience with radium is as follows: 100 patients were treated with radium alone; 50 of them for recurrences, in whom little benefit was expected or obtained. Of the others, 25 were operable (but were not operated upon on account of serious physical defects), and 25 were inoperable. Only 5, or 10 per cent, are at present in good health; of these, one was clearly inoperable, two were borderline cases, and two were operable. Of the cases which were operable or borderline, these 4 represent 16 per cent; a fair figure, but only two years have expired since the treatment. In another series, 44 patients were given postoperative radium treatment; of these, 22 or 50 per cent, have developed recurrences, while in an earlier series, without postoperative radiation, 60.86 per cent are free from recurrences. The reason for the higher percentage in the radiated patients is not known. Faure believes that late recurrences are more often encountered after treatment with radium alone than after operation alone; here recurrence after the second year is rare. He has noted that occasionally radium can convert an inoperable case into an operable one; the operation should be performed in 4 to 6 weeks after radiation, in order to avoid the dense connective tissue encountered later.

Turning to his operative results, he found that of 102 private cases, 11 died following operation, a primary mortality of 10.88 per cent. Two died within a few months of causes independent of the operation. Of 96 cases operated upon more than one year ago, 13 have died as noted, 42 are cured, and in 41 the cancer has recurred. Dividing these cases from the point of view of operability into good, borderline, and bad, the results are as follows: Good (21 cases), mortality, 4.76 per cent, cures, 75 per cent, recurrences, 25 per cent; borderline (35 cases), mortality, 85.72 per cent, cures, 62.5 per cent, recurrences, 37.5 per cent; bad (40 cases), mortality, 22.5 per cent, cures, 19.35 per cent, recurrences, 80.65 per cent. Combining the good and the borderline cases, there was a primary mortality of 7.14 per cent, with two-thirds cures and one-third recurrences. The author considers these results superior to those so far obtained with radium, so that he prefers operation in favorable cases, in spite of the figures of Recasens and of Kelly.

He concludes that radium should be used in inoperable cases as a palliative; occasionally a cure will be obtained. For the other cases, he prefers operation if the surgeon has developed a skillful and careful technic, if the operation is sufficiently extensive, and if it is rapidly executed. If the work is completed in an hour or less, nearly all the patients will recover; if it takes two hours, one-half will be lost; if the operation lasts three hours, none will survive.

E. L. KING.

Mallet, Lucien: Treatment of Cancer of the Uterine Cervix. Necessity of the Association of Radium and Deep X-ray Therapy. *La Presse Médicale*, 1923, No. 25, p. 289.

The author is of the opinion that deep x-ray therapy alone, given through multiple portals of entry, does not suffice; it is particularly efficacious in reaching parametrial involvements and extensions to the lymphatic nodes, but is not quite so certain in its action on the cervix itself. Here radium is especially effective, but it is well known that its destructive action on cancer cells extends for a distance of only 3 cm.; further efficacy is obtained only by using doses so large that the vesical and rectal mucous membranes are profoundly irritated. He estimates that for an early basal cell epithelioma (which is particularly susceptible to radium) a dose of 45 to 50 millicuries is necessary, which is spread out over 5 or 6 days. If the histologic examination shows the cancer to be of the spindle-cellular type, which is more radioresistant, the application may be advantageously extended over a longer period of time, even 25 days (Nobias), but employing only 10 mg. of the element, so as to obtain the same total dose. Of course, the field of action of radium can be extended by placing multiple small doses (2 mg. element) in the broad ligaments through an abdominal incision.

The disadvantages of deep x-ray therapy are (1) risk of developing "radio-resistance" (2) excitation of cells at a distance; (3) danger of a grave general reaction. Radium produces only a slight systemic effect, or none at all, but its limited field is its disadvantage, hence the desirability of combining the two methods.

The author is opposed to the fairly common practice of treating with radium and then operating three or four weeks later, as he is sure that recurrences are more frequent than after operation alone, except in the spindle-cellular type. This type is sensitive to radium, but resistant to the x-ray, and hence is better handled by radium and surgery, in spite of the risk of recurrences and of implantation metastases. In other types, he feels that a combination of radium and deep x-ray therapy is the best treatment in the great majority of cases.

E. L. KING.

Mahle: The Morphological Histology of Adenocarcinoma of the Body of the Uterus in Relation to Longevity. Surgery, Gynecology and Obstetrics, 1923, xxxvi, 385.

Of 855 cases of carcinoma of the uterus observed at the Mayo Clinic, 186 or 29.7 per cent were situated in the body. Mahle divides these into four groups according to MacCarty's standard of cellular differentiation, Group I consisting of the most highly differentiated tumors (malignant adenomata), while Group IV consists of tumors in which the cells show no differentiation whatever, the other two groups being made up of intermediary types.

The difference in the postoperative outcome was quite marked between the several groups. Of Group I all were alive, while in Group IV all had died from recurrence. The greatest number (61.29 per cent) were in Group II of which 72 per cent of the patients traced were alive.

Mahle concludes that the more favorable outcome of corpus carcinoma is due to the fact that most of these growths are of a high degree of differentiation and that a relative prognosis may be made from the histological structure of the tumor.

R. E. WOBBS.

Sunde: Chorionepithelioma malignum. Acta Gynecologica Scandinavica, 1921, i, 16.

A clinical and pathological study is made of 38 cases of chorionepithelioma and 240 cases of hydatid mole. Of the 38 patients with chorionepithelioma, 26 died, a mortality of 68.4 per cent; however, only 18 of them were operable; hence, with 12 cures, the incidence of cure was 67 per cent. Of the 26 lethal cases, 10 followed hydatid mole, seven abortion, 8 occurred after normal birth and one was found after an ovarian pregnancy. Of the 12 cured cases, 11 followed hydatid mole and one occurred after an abortion.

Sunde believes that hydatid mole occurs two and one-half times as frequently as normal pregnancy in the age group above 40 years and chorionepithelioma occurs three times as often as normal pregnancy in this same age group. This might be interpreted to mean that the older woman has difficulty in resisting the invasion of fetal cell elements. The percentage of multiparae is nearly twice as great among patients with chorionepithelioma as among those with normal pregnancy. Approximately 40 per cent of chorionepitheliomas arise from hydatid mole but only 5 per cent of the patients with hydatid mole develop chorionepithelioma. The first and most constant symptom, genital hemorrhage, usually begins within a few weeks or months after pregnancy. The diagnosis of chorionepithelioma malignum may offer the greatest difficulty, since the microscopic examination often neither permits a positive diagnosis nor excludes the possibility of the tumor. The clinical examination must be supplemented by an intrauterine digital exploration. When in the uterine cavity there is found a fixed projecting tumor of soft, elastic consistency like placental tissue, the uterus should be extirpated. The only correct treatment for chorionepithelioma is vaginal hysterectomy.

J. P. GREENHILL.

Item

American Association of Obstetricians, Gynecologists and Abdominal Surgeons

The next regular meeting will take place in Cleveland, Ohio, on September 18th, 19th, and 20th, 1924. President, Dr. James F. Baldwin, Columbus, Ohio; Secretary, Dr. James E. Davis, Detroit, Mich.

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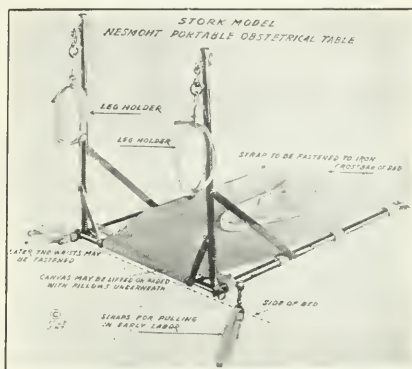
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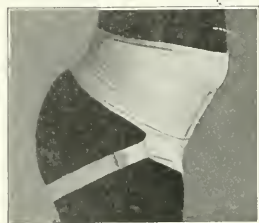
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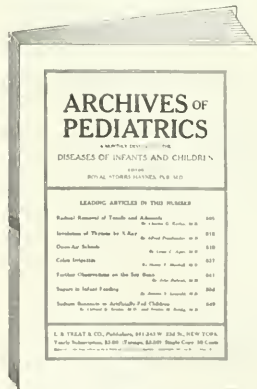
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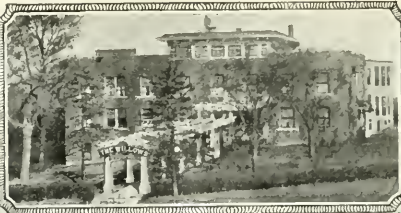
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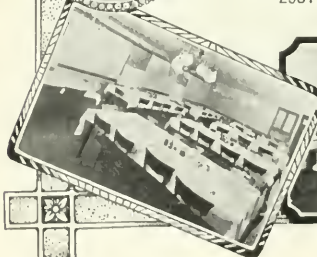
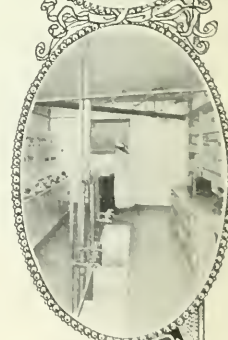
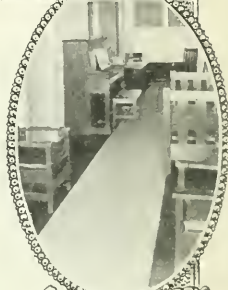
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